SEQUENCE LISTING

<110> Duvick, Jon
     Maddox, Joyce
     Navarro Acevedo, Pedro
     Simmons, Carl R.

<120> Maize Peroxidase Genes and Their Use for
  Improving Plant Disease Resistance and Stalk Strength

<130> 35718/242052

<150> US 60/262,595
<151> 2001-01-18

<160> 37

<170> FastSEQ for Windows Version 4.0

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<213> Zea mays

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Ser Cys Cys Met Gln Gly Gly Gly Pro Ala Tyr Lys Leu Pro Leu Gly
            5   10   15

agg cgc gac ggg ctg gcg ccg gca tcg aac gcc gcc gtc cta gcg gcg   155
Arg Arg Asp Gly Leu Ala Pro Ala Ser Asn Ala Ala Val Leu Ala Ala
         20   25   30

ctc cca ccg ccg acg tcc aag gtg ccg acg ctg ctg tcc ttc ctg gcg   203
Leu Pro Pro Pro Thr Ser Lys Val Pro Thr Leu Leu Ser Phe Leu Ala
     35   40   45

aag atc aac ctg gac gtg acg gac ctg gtg gcg ctg tcg ggc ggg cac   251
Lys Ile Asn Leu Asp Val Thr Asp Leu Val Ala Leu Ser Gly Gly His
 50   55   60   65

acg gtg ggc atc gcg cac tgc ggc tcc ttc gac aac cgg ctg ttc ccg   299
Thr Val Gly Ile Ala His Cys Gly Ser Phe Asp Asn Arg Leu Phe Pro
                 70   75   80

acg cag gac ccg acg ctg aac aag ttc ttc gcg ggg cag ctg tac cgg   347
Thr Gln Asp Pro Thr Leu Asn Lys Phe Phe Ala Gly Gln Leu Tyr Arg

1

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acc tgc ccg acc aac gcg acg gtc aac acg acg gcc aac gac gtc cgc          395
Thr Cys Pro Thr Asn Ala Thr Val Asn Thr Thr Ala Asn Asp Val Arg
        100                 105                 110

acg ccc aac gcc ttc gac aac aag tac tac gtg gac ctg ctc aac cgg          443
Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Val Asp Leu Leu Asn Arg
        115                 120                 125

gag ggc ctc ttc acg tcg gac cag gac ctg ctg acc aac gcc acc acg          491
Glu Gly Leu Phe Thr Ser Asp Gln Asp Leu Leu Thr Asn Ala Thr Thr
130                 135                 140                 145

cgc ccc atc gtc acg cgc ttc gcc gtc gac cag gac gcc ttc ttc gac          539
Arg Pro Ile Val Thr Arg Phe Ala Val Asp Gln Asp Ala Phe Phe Asp
                150                 155                 160

cag ttc gtc tac tcc tac gtc aag atg ggg cag gtc aac gtg ctc acg          587
Gln Phe Val Tyr Ser Tyr Val Lys Met Gly Gln Val Asn Val Leu Thr
                165                 170                 175

ggc tcc cag gga cag gtc cgc gcc aac tgc tcc gcg cgc aac ggc gcc          635
Gly Ser Gln Gly Gln Val Arg Ala Asn Cys Ser Ala Arg Asn Gly Ala
            180                 185                 190

gct gct ggt gac agt gac ctg ccg tgg tcg tcc gtc gtc atc gag aca          683
Ala Ala Gly Asp Ser Asp Leu Pro Trp Ser Ser Val Val Ile Glu Thr
            195                 200                 205

gtc gcc gac gcc gcc ggt agc ctc gtg ctc tag ataataagca aataagtagt        736
Val Ala Asp Ala Ala Gly Ser Leu Val Leu *
210                 215
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ttgaagcttt cttcgcatgc atgttgcaac aaataagcag ctagtagcgt tgggaataaa        796
gcagctagta gcgatcaaaa aaaaaaaaaa aaaaa                                    831
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<210> 2
<211> 219
<212> PRT
<213> Zea mays

<400> 2

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Gly Arg Arg Asp Gly Leu Ala Pro Ala Ser Asn Ala Ala Val Leu Ala
            20                  25                  30
Ala Leu Pro Pro Pro Thr Ser Lys Val Pro Thr Leu Leu Ser Phe Leu
        35                  40                  45
Ala Lys Ile Asn Leu Asp Val Thr Asp Leu Val Ala Leu Ser Gly Gly
    50                  55                  60
His Thr Val Gly Ile Ala His Cys Gly Ser Phe Asp Asn Arg Leu Phe
65                  70                  75                  80
Pro Thr Gln Asp Pro Thr Leu Asn Lys Phe Phe Ala Gly Gln Leu Tyr
                85                  90                  95
Arg Thr Cys Pro Thr Asn Ala Thr Val Asn Thr Thr Ala Asn Asp Val
                100                 105                 110
```

2

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Arg Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Val Asp Leu Leu Asn
        115                 120                 125
Arg Glu Gly Leu Phe Thr Ser Asp Gln Asp Leu Leu Thr Asn Ala Thr
        130                 135                 140
Thr Arg Pro Ile Val Thr Arg Phe Ala Val Asp Gln Asp Ala Phe Phe
145                 150                 155                 160
Asp Gln Phe Val Tyr Ser Tyr Val Lys Met Gly Gln Val Asn Val Leu
                165                 170                 175
Thr Gly Ser Gln Gly Gln Val Arg Ala Asn Cys Ser Ala Arg Asn Gly
                180                 185                 190
Ala Ala Ala Gly Asp Ser Asp Leu Pro Trp Ser Ser Val Val Ile Glu
        195                 200                 205
Thr Val Ala Asp Ala Ala Gly Ser Leu Val Leu
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<220>
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<222> (67)...(1008)

<400> 3

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cttgcc atg gcg tct ccc acc ttg atg caa tgc ctg gtc gcc gtt tcc         108
       Met Ala Ser Pro Thr Leu Met Gln Cys Leu Val Ala Val Ser
        1               5                  10

ctc ctc tcc tgt gtc gcc cac gca cag ctc tcg ccc acg ttc tat gcg       156
Leu Leu Ser Cys Val Ala His Ala Gln Leu Ser Pro Thr Phe Tyr Ala
 15                  20                  25                  30

tcc tcc tgc ccc aac ctg cag agc atc gtt cgg gcg gcg atg acc cag       204
Ser Ser Cys Pro Asn Leu Gln Ser Ile Val Arg Ala Ala Met Thr Gln
                 35                  40                  45

gcc gtc gca agt gag cag agg atg ggc gcc tct ctg ctc agg ctc ttc       252
Ala Val Ala Ser Glu Gln Arg Met Gly Ala Ser Leu Leu Arg Leu Phe
                 50                  55                  60

ttc cac gac tgc ttc gtt caa ggc tgc gac gga tcg atc ctt ctc gac       300
Phe His Asp Cys Phe Val Gln Gly Cys Asp Gly Ser Ile Leu Leu Asp
             65                  70                  75

gcc gga ggg gag aag acc gcc ggg ccg aac ctg aac tcg gtg cgc ggc       348
Ala Gly Gly Glu Lys Thr Ala Gly Pro Asn Leu Asn Ser Val Arg Gly
         80                  85                  90

ttt gag gtc atc gac acc atc aag cgg aac gtc gag gcc gcg tgc ccc       396
Phe Glu Val Ile Asp Thr Ile Lys Arg Asn Val Glu Ala Ala Cys Pro
 95                  100                 105                 110

ggc gtc gtg tcg tgc gcc gac atc ctc gcg ctt gcc gcg cgc gac gga       444
Gly Val Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Arg Asp Gly
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3

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acc aac ctt ctc ggc ggg ccg acc tgg agc gtg ccg ctc ggg cgg cgg    492
Thr Asn Leu Leu Gly Gly Pro Thr Trp Ser Val Pro Leu Gly Arg Arg
        130                135                140

gac tcg acg acg gcc agc gcc tcg ctc gcc aac agc aac ccc ccg ccc    540
Asp Ser Thr Thr Ala Ser Ala Ser Leu Ala Asn Ser Asn Pro Pro Pro
        145                150                155

ccg acg gcc agc ctc ggc acg ctc atc tcc ctg ttc ggc agg cag ggc    588
Pro Thr Ala Ser Leu Gly Thr Leu Ile Ser Leu Phe Gly Arg Gln Gly
        160                165                170

ctg tcg ccg cgc gac atg acg gcg ctg tcg ggc gcg cac acc atc ggg    636
Leu Ser Pro Arg Asp Met Thr Ala Leu Ser Gly Ala His Thr Ile Gly
175                180                185                190

cag gcc cgg tgc acc acc ttc cgc ggc cgc atc tac ggc gac acc gac    684
Gln Ala Arg Cys Thr Thr Phe Arg Gly Arg Ile Tyr Gly Asp Thr Asp
                195                200                205

atc aac gcc tcc ttc gcg gcg ctg cgg cag cag acg tgc ccg cgg tcc    732
Ile Asn Ala Ser Phe Ala Ala Leu Arg Gln Gln Thr Cys Pro Arg Ser
                210                215                220

ggc ggc gac ggc aac ctg gcg ccc atc gac gtg cag acg ccg gtg agg    780
Gly Gly Asp Gly Asn Leu Ala Pro Ile Asp Val Gln Thr Pro Val Arg
        225                230                235

ttc gac acg gcc tac ttc acc aac ctg ctg tcg cgg cgg ggc ctg ttc    828
Phe Asp Thr Ala Tyr Phe Thr Asn Leu Leu Ser Arg Arg Gly Leu Phe
        240                245                250

cac tcg gac cag gag ctc ttc aac ggc ggg tcg cag gac gcg ctg gtg    876
His Ser Asp Gln Glu Leu Phe Asn Gly Gly Ser Gln Asp Ala Leu Val
255                260                265                270

agg cag tac agc gcc agc gcc tcg ctc ttc aac gcc gac ttc gtg gca    924
Arg Gln Tyr Ser Ala Ser Ala Ser Leu Phe Asn Ala Asp Phe Val Ala
                275                280                285

gcc atg att agg atg ggc aac gtt ggg gtg ctc acc ggc acc gcc gga    972
Ala Met Ile Arg Met Gly Asn Val Gly Val Leu Thr Gly Thr Ala Gly
        290                295                300

cag atc agg cgc aac tgc cgg gtc gtc aac agc tag atacgacgca    1018
Gln Ile Arg Arg Asn Cys Arg Val Val Asn Ser  *
        305                310

tcggattcga tcgatatact tgtagctata gctagcttgc tcgtcgaccg agcgcacatt    1078
gatagatcga ccgacataga gctcgcttct gatgaacccc agtacgtgta ctctctagta    1138
tatatacata gatatagcta tagattgaac acgtcgtcaa taccagtaga ataagtggtg    1198
aacgaccacg caaggagaag agtgatcgaa gcagtgtcac ttggttaccg aaatgattca    1258
tctgacattt tcgtattgga ttttgaacgc aactatatat atatatatat acactgttga    1318
cacctttttc ggaaaaaaaa aaaaaaaaaa aaaaaa    1354
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4

<210> 4
<211> 313
<212> PRT
<213> Zea mays

<400> 4
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                20                  25                  30
Cys Pro Asn Leu Gln Ser Ile Val Arg Ala Ala Met Thr Gln Ala Val
            35                  40                  45
Ala Ser Glu Gln Arg Met Gly Ala Ser Leu Leu Arg Leu Phe Phe His
        50                  55                  60
Asp Cys Phe Val Gln Gly Cys Asp Gly Ser Ile Leu Leu Asp Ala Gly
65                  70                  75                  80
Gly Glu Lys Thr Ala Gly Pro Asn Leu Asn Ser Val Arg Gly Phe Glu
                85                  90                  95
Val Ile Asp Thr Ile Lys Arg Asn Val Glu Ala Ala Cys Pro Gly Val
            100                 105                 110
Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Arg Asp Gly Thr Asn
        115                 120                 125
Leu Leu Gly Gly Pro Thr Trp Ser Val Pro Leu Gly Arg Arg Asp Ser
        130                 135                 140
Thr Thr Ala Ser Ala Ser Leu Ala Asn Ser Asn Pro Pro Pro Pro Thr
145                 150                 155                 160
Ala Ser Leu Gly Thr Leu Ile Ser Leu Phe Gly Arg Gln Gly Leu Ser
                165                 170                 175
Pro Arg Asp Met Thr Ala Leu Ser Gly Ala His Thr Ile Gly Gln Ala
            180                 185                 190
Arg Cys Thr Thr Phe Arg Gly Arg Ile Tyr Gly Asp Thr Asp Ile Asn
        195                 200                 205
Ala Ser Phe Ala Ala Leu Arg Gln Gln Thr Cys Pro Arg Ser Gly Gly
        210                 215                 220
Asp Gly Asn Leu Ala Pro Ile Asp Val Gln Thr Pro Val Arg Phe Asp
225                 230                 235                 240
Thr Ala Tyr Phe Thr Asn Leu Leu Ser Arg Arg Gly Leu Phe His Ser
                245                 250                 255
Asp Gln Glu Leu Phe Asn Gly Gly Ser Gln Asp Ala Leu Val Arg Gln
            260                 265                 270
Tyr Ser Ala Ser Ala Ser Leu Phe Asn Ala Asp Phe Val Ala Ala Met
        275                 280                 285
Ile Arg Met Gly Asn Val Gly Val Leu Thr Gly Thr Ala Gly Gln Ile
        290                 295                 300
Arg Arg Asn Cys Arg Val Val Asn Ser
305                 310
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<211> 1263
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (29)...(1099)

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                            Met Ala Arg Ser Ser Gly Ser Arg
                            1   5

cca gtg gcc ctc gtg ctg ctg gcg ctg tgc gcc gcc gcc ctc tcg tcg   100
Pro Val Ala Leu Val Leu Leu Ala Leu Cys Ala Ala Ala Leu Ser Ser
    10   15   20

gcc acg gtg acc gtg aat gag ccc atc gcc aat ggc ctc tcc tgg agc   148
Ala Thr Val Thr Val Asn Glu Pro Ile Ala Asn Gly Leu Ser Trp Ser
25   30   35   40

ttc tac gac gtt tcc tgc ccg tcg gtg gag ggc atc gtg cgc tgg cac   196
Phe Tyr Asp Val Ser Cys Pro Ser Val Glu Gly Ile Val Arg Trp His
                45   50   55

gtc gcc gag gcc ctc cgc cgc gac atc ggc atc gcc gcg ggg ctc atc   244
Val Ala Glu Ala Leu Arg Arg Asp Ile Gly Ile Ala Ala Gly Leu Ile
                60   65   70

cgc atc ttc ttc cac gac tgc ttc ccg cag ggc tgc gac gcg tcc gtc   292
Arg Ile Phe Phe His Asp Cys Phe Pro Gln Gly Cys Asp Ala Ser Val
            75   80   85

ctc ctg tct ggt tcc aac agc gag cag atc gag gta ccc aac cag acg   340
Leu Leu Ser Gly Ser Asn Ser Glu Gln Ile Glu Val Pro Asn Gln Thr
        90   95   100

ctg cgt ccc gag gcg ctc aag ctc atc gac gac atc cgc gcc gcc gtc   388
Leu Arg Pro Glu Ala Leu Lys Leu Ile Asp Asp Ile Arg Ala Ala Val
105   110   115   120

cac gcc gtc tgc ggg ccc acg gtg tcc tgc gcc gac atc aca acg ctc   436
His Ala Val Cys Gly Pro Thr Val Ser Cys Ala Asp Ile Thr Thr Leu
                125   130   135

gcc acc agg gac gcc gtc gtc gcg tcc ggc ggc ccc ttc ttc gag gtt   484
Ala Thr Arg Asp Ala Val Val Ala Ser Gly Gly Pro Phe Phe Glu Val
                140   145   150

cct ctc ggg cgg cgc gac ggt ctg gcg ccg gcg tca agc gac ctg gtg   532
Pro Leu Gly Arg Arg Asp Gly Leu Ala Pro Ala Ser Ser Asp Leu Val
            155   160   165

ggc acc ctg ccg gcg ccc ttc ttc gac gtg ccg acg ctg atc gag tcg   580
Gly Thr Leu Pro Ala Pro Phe Phe Asp Val Pro Thr Leu Ile Glu Ser
    170   175   180

ttc aag aac cgg agc ctg gac aag gcg gac ctg gtg gcg ctg tcc ggc   628
Phe Lys Asn Arg Ser Leu Asp Lys Ala Asp Leu Val Ala Leu Ser Gly
185   190   195   200

gcg cac acg gtg ggc cgc ggc cac tgc gtt tcc ttc agc gac cgg ctg   676
Ala His Thr Val Gly Arg Gly His Cys Val Ser Phe Ser Asp Arg Leu
                205   210   215

6

```
ccg ccc aac gcg gac gat ggc acc atg gac ccg gcg ttc cgg cag agg        724
Pro Pro Asn Ala Asp Asp Gly Thr Met Asp Pro Ala Phe Arg Gln Arg
            220                 225             230

ctg acg gcc aag tgc gcc agc gac ccc agc ggg aac gtg gtg acc cag        772
Leu Thr Ala Lys Cys Ala Ser Asp Pro Ser Gly Asn Val Val Thr Gln
            235             240             245

gtg ctg gac gtg cgc acg ccc aac gcc ttc gac aac aag tac tac ttc        820
Val Leu Asp Val Arg Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Phe
            250             255             260

gac ctt atc gcc aag cag ggg ctc ttc aag tcg gac cag ggc ctc atc        868
Asp Leu Ile Ala Lys Gln Gly Leu Phe Lys Ser Asp Gln Gly Leu Ile
265                 270             275             280

aac cac ccg gac acc aag cgc gcg gcc acc cgc ttc gcg ctc aac cag        916
Asn His Pro Asp Thr Lys Arg Ala Ala Thr Arg Phe Ala Leu Asn Gln
                285             290             295

gcc gcc ttc ttc gac cag ttc gcc agg tcc atg gtg aag atg agc cag        964
Ala Ala Phe Phe Asp Gln Phe Ala Arg Ser Met Val Lys Met Ser Gln
            300             305             310

atg gac atc ctc acc ggc agc gcg gga gag atc cgc cgc aac tgc tcc       1012
Met Asp Ile Leu Thr Gly Ser Ala Gly Glu Ile Arg Arg Asn Cys Ser
            315             320             325

gtg cgc aac acc gcc ctc gga gat gtc tca tcg tca gcc cag ctc gag       1060
Val Arg Asn Thr Ala Leu Gly Asp Val Ser Ser Ser Ala Gln Leu Glu
            330             335             340

acc acc gcg ggc gac gag ggg ctc gcg gcc gac gcg tga aatgatgatt       1109
Thr Thr Ala Gly Asp Glu Gly Leu Ala Ala Asp Ala  *
345                 350             355

agctgctgtt gtttttctct ggtctccttc tgttcaaata aggcttgctg catcattggt       1169
atagtttgca ttcttctacc catcaatatg gtaaaaaaaa aaaaaaaaaa aaaaaaaaaa       1229
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaa                                   1263

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<212> PRT
<213> Zea mays

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            20                  25                  30
Ile Ala Asn Gly Leu Ser Trp Ser Phe Tyr Asp Val Ser Cys Pro Ser
            35                  40                  45
Val Glu Gly Ile Val Arg Trp His Val Ala Glu Ala Leu Arg Arg Asp
            50                  55                  60
Ile Gly Ile Ala Ala Gly Leu Ile Arg Ile Phe Phe His Asp Cys Phe
65                  70                  75                  80
Pro Gln Gly Cys Asp Ala Ser Val Leu Leu Ser Gly Ser Asn Ser Glu
```

7

Gln Ile Glu Val Pro Asn Gln Thr Leu Arg Pro Glu Ala Leu Lys Leu
                   100   105   110
Ile Asp Asp Ile Arg Ala Ala Val His Ala Val Cys Gly Pro Thr Val
              115   120   125
Ser Cys Ala Asp Ile Thr Thr Leu Ala Thr Arg Asp Ala Val Val Ala
         130   135   140
Ser Gly Gly Pro Phe Phe Glu Val Pro Leu Gly Arg Arg Asp Gly Leu
145   150   155   160
Ala Pro Ala Ser Ser Asp Leu Val Gly Thr Leu Pro Ala Pro Phe Phe
                   165   170   175
Asp Val Pro Thr Leu Ile Glu Ser Phe Lys Asn Arg Ser Leu Asp Lys
              180   185   190
Ala Asp Leu Val Ala Leu Ser Gly Ala His Thr Val Gly Arg Gly His
         195   200   205
Cys Val Ser Phe Ser Asp Arg Leu Pro Pro Asn Ala Asp Asp Gly Thr
    210   215   220
Met Asp Pro Ala Phe Arg Gln Arg Leu Thr Ala Lys Cys Ala Ser Asp
225   230   235   240
Pro Ser Gly Asn Val Val Thr Gln Val Leu Asp Val Arg Thr Pro Asn
                   245   250   255
Ala Phe Asp Asn Lys Tyr Tyr Phe Asp Leu Ile Ala Lys Gln Gly Leu
                   260   265   270
Phe Lys Ser Asp Gln Gly Leu Ile Asn His Pro Asp Thr Lys Arg Ala
         275   280   285
Ala Thr Arg Phe Ala Leu Asn Gln Ala Ala Phe Phe Asp Gln Phe Ala
    290   295   300
Arg Ser Met Val Lys Met Ser Gln Met Asp Ile Leu Thr Gly Ser Ala
305   310   315   320
Gly Glu Ile Arg Arg Asn Cys Ser Val Arg Asn Thr Ala Leu Gly Asp
              325   330   335
Val Ser Ser Ser Ala Gln Leu Glu Thr Thr Ala Gly Asp Glu Gly Leu
         340   345   350
Ala Ala Asp Ala
         355

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<212> DNA
<213> Zea mays

<220>
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<222> (146)...(1222)

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agcaaccgcg tttcccagat tccttggcac tgcagcagct gcgtccaagc ttgctaggtg   120
gtggcggcag cagcagcctg cgcct atg tac act gca atg gca gcg cga ccg   172
                            Met Tyr Thr Ala Met Ala Ala Arg Pro
                              1   5

ctt ctt ctt ccc cct ccg gtc ctc ctc ctc ctc ctc ctg gtg gcg gtg   220
Leu Leu Leu Pro Pro Pro Val Leu Leu Leu Leu Leu Leu Val Ala Val
  10   15   20   25

8

```
ctg gct gct tct tcg gcc gcc cat ggc tat ggc tac ggc tac ggc ggc        268
Leu Ala Ala Ser Ser Ala Ala His Gly Tyr Gly Tyr Gly Tyr Gly Gly
            30                  35                  40

gac gct gct gct gag ctc agg gtc ggg ttc tac aag gac tcg tgc ccg        316
Asp Ala Ala Ala Glu Leu Arg Val Gly Phe Tyr Lys Asp Ser Cys Pro
            45                  50                  55

gac gcc gag gcc gtc gtc cgc agg atc gtc gcc aag gcc gtc cgc gag        364
Asp Ala Glu Ala Val Val Arg Arg Ile Val Ala Lys Ala Val Arg Glu
            60                  65                  70

gac ccc acg gcc aac gcg ccg ctg ctc agg ctc cac ttc cac gac tgc        412
Asp Pro Thr Ala Asn Ala Pro Leu Leu Arg Leu His Phe His Asp Cys
            75                  80                  85

ttc gtc cgg ggc tgc gac ggc tcc gtg ctc gtc aac tcc acc agg ggg        460
Phe Val Arg Gly Cys Asp Gly Ser Val Leu Val Asn Ser Thr Arg Gly
    90                  95                  100                 105

aac acg gcg gag aag gac gcc aag ccc aac cac acg ctg gac gcc ttc        508
Asn Thr Ala Glu Lys Asp Ala Lys Pro Asn His Thr Leu Asp Ala Phe
                    110                 115                 120

gac gtc atc gac gac atc aag gag gcg ctg gag aag cgc tgc ccg ggg        556
Asp Val Ile Asp Asp Ile Lys Glu Ala Leu Glu Lys Arg Cys Pro Gly
                125                 130                 135

acc gtc tcc tgc gcc gac atc ctc gcc atc gcc gcc agg gac gcc gta        604
Thr Val Ser Cys Ala Asp Ile Leu Ala Ile Ala Ala Arg Asp Ala Val
            140                 145                 150

tcg ctg gcc acc aag gtg gtc acc aag ggc ggc tgg agc agg gac ggc        652
Ser Leu Ala Thr Lys Val Val Thr Lys Gly Gly Trp Ser Arg Asp Gly
    155                 160                 165

aac ctc tac cag gtg gag acc ggc agg cgg gac ggc cgc gtg tcc aga        700
Asn Leu Tyr Gln Val Glu Thr Gly Arg Arg Asp Gly Arg Val Ser Arg
170                 175                 180                 185

gcc aag gag gcc gtc aag aac ttg ccg gac tcc atg gat ggc atc cgc        748
Ala Lys Glu Ala Val Lys Asn Leu Pro Asp Ser Met Asp Gly Ile Arg
                    190                 195                 200

aag ctc atc agg agg ttc gct tcc aag aac ctc agc gtc aag gat ctc        796
Lys Leu Ile Arg Arg Phe Ala Ser Lys Asn Leu Ser Val Lys Asp Leu
                205                 210                 215

gct gtt ctc tca ggc gcc cac gcg atc ggc aaa tcg cac tgc ccg tcg        844
Ala Val Leu Ser Gly Ala His Ala Ile Gly Lys Ser His Cys Pro Ser
            220                 225                 230

atc gcc aag cgg ctg cgc aac ttc acg gcg cac cgg gac agc gac ccg        892
Ile Ala Lys Arg Leu Arg Asn Phe Thr Ala His Arg Asp Ser Asp Pro
    235                 240                 245

acc ctg gac ggc gcg tac gcg gcg gag ctg agg cgg cag tgc cgg agc        940
```

9

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Thr Leu Asp Gly Ala Tyr Ala Ala Glu Leu Arg Arg Gln Cys Arg Ser
250             255             260             265

cgc agg gac aac acg acg gag ctg gag atg gtg ccg ggg agc tcc acc    988
Arg Arg Asp Asn Thr Thr Glu Leu Glu Met Val Pro Gly Ser Ser Thr
                270             275             280

gcg ttc ggc acg gcc tac tac ggc ctg gtc gcg gag cgg agg gcg ctc   1036
Ala Phe Gly Thr Ala Tyr Tyr Gly Leu Val Ala Glu Arg Arg Ala Leu
            285             290             295

ttc cac tcc gac gag gcg ctg ctc agg aac ggg gag acc agg gcg ctc   1084
Phe His Ser Asp Glu Ala Leu Leu Arg Asn Gly Glu Thr Arg Ala Leu
        300             305             310

gtc tac cgc tac agg gac gcg ccg tcg gag gcg ccg ttc ctc gcg gac   1132
Val Tyr Arg Tyr Arg Asp Ala Pro Ser Glu Ala Pro Phe Leu Ala Asp
        315             320             325

ttc ggg gcg tcc atg ctc aac atg ggc agg gtg ggc gtg ctc acc ggc   1180
Phe Gly Ala Ser Met Leu Asn Met Gly Arg Val Gly Val Leu Thr Gly
330             335             340             345

gcc cag ggg gag atc agg aag agg tgc gcc ttt gtc aac tag           1222
Ala Gln Gly Glu Ile Arg Lys Arg Cys Ala Phe Val Asn  *
                350             355

ctagcgatgc tgtattgtac tttgtaccct ctcgccttaa ttaaaattta aatgctggag  1282
tttcaccccg gtctcgagag aatcttccat ttttactact acatagattt aggaacgttt  1342
ctaggtttta tatgattgtg aaacgtttgg gctgagctca tctgtaactg taaactctga  1402
tggaatgcga taacgtgttc caaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa  1462
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaa     1519


<210> 8
<211> 358
<212> PRT
<213> Zea mays

<400> 8
Met Tyr Thr Ala Met Ala Ala Arg Pro Leu Leu Leu Pro Pro Pro Val
 1               5               10              15
Leu Leu Leu Leu Leu Leu Val Ala Val Leu Ala Ala Ser Ser Ala Ala
            20              25              30
His Gly Tyr Gly Tyr Gly Tyr Gly Gly Asp Ala Ala Ala Glu Leu Arg
        35              40              45
Val Gly Phe Tyr Lys Asp Ser Cys Pro Asp Ala Glu Ala Val Val Arg
    50              55              60
Arg Ile Val Ala Lys Ala Val Arg Glu Asp Pro Thr Ala Asn Ala Pro
65              70              75              80
Leu Leu Arg Leu His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly
            85              90              95
Ser Val Leu Val Asn Ser Thr Arg Gly Asn Thr Ala Glu Lys Asp Ala
            100             105             110
Lys Pro Asn His Thr Leu Asp Ala Phe Asp Val Ile Asp Asp Ile Lys
        115             120             125
Glu Ala Leu Glu Lys Arg Cys Pro Gly Thr Val Ser Cys Ala Asp Ile
        130             135             140
```

10

```
Leu Ala Ile Ala Ala Arg Asp Ala Val Ser Leu Ala Thr Lys Val Val
145                 150                 155                 160
Thr Lys Gly Gly Trp Ser Arg Asp Gly Asn Leu Tyr Gln Val Glu Thr
                165                 170                 175
Gly Arg Arg Asp Gly Arg Val Ser Arg Ala Lys Glu Ala Val Lys Asn
            180                 185                 190
Leu Pro Asp Ser Met Asp Gly Ile Arg Lys Leu Ile Arg Arg Phe Ala
        195                 200                 205
Ser Lys Asn Leu Ser Val Lys Asp Leu Ala Val Leu Ser Gly Ala His
    210                 215                 220
Ala Ile Gly Lys Ser His Cys Pro Ser Ile Ala Lys Arg Leu Arg Asn
225                 230                 235                 240
Phe Thr Ala His Arg Asp Ser Asp Pro Thr Leu Asp Gly Ala Tyr Ala
                245                 250                 255
Ala Glu Leu Arg Arg Gln Cys Arg Ser Arg Arg Asp Asn Thr Thr Glu
            260                 265                 270
Leu Glu Met Val Pro Gly Ser Ser Thr Ala Phe Gly Thr Ala Tyr Tyr
        275                 280                 285
Gly Leu Val Ala Glu Arg Arg Ala Leu Phe His Ser Asp Glu Ala Leu
    290                 295                 300
Leu Arg Asn Gly Glu Thr Arg Ala Leu Val Tyr Arg Tyr Arg Asp Ala
305                 310                 315                 320
Pro Ser Glu Ala Pro Phe Leu Ala Asp Phe Gly Ala Ser Met Leu Asn
                325                 330                 335
Met Gly Arg Val Gly Val Leu Thr Gly Ala Gln Gly Glu Ile Arg Lys
                340                 345                 350
Arg Cys Ala Phe Val Asn
                355


<210> 9
<211> 1480
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (154)...(1194)

<400> 9
agtcactcga gcccgcccgg gtctcttcct cttccattga ttccattcaa gatcactact     60
gttaccagcc agccagtcgt tcgttaagaa gagagcgagc gagcaagaga gagagagagg    120
gagaaggggg aagatcagaa cgaagagagg gag atg agg ggg caa acg cag aca    174
                                    Met Arg Gly Gln Thr Gln Thr
                                    1                   5


gct tcc gcg ggg ggc cgg tgg cga ggc gac ggc gct gcg gcg tgg tgt    222
Ala Ser Ala Gly Gly Arg Trp Arg Gly Asp Gly Ala Ala Ala Trp Cys
        10                  15                  20


tgg tgg tgg gtg gcc gtg gtc ctc ctg ctt ggc cat tta ccg agc tgc    270
Trp Trp Trp Val Ala Val Val Leu Leu Leu Gly His Leu Pro Ser Cys
    25                  30                  35


gcg cgc gcg ggg ctg ctg gag tcc aac ccg ggc ctg gcc tac aac ttc    318
Ala Arg Ala Gly Leu Leu Glu Ser Asn Pro Gly Leu Ala Tyr Asn Phe
40                  45                  50                  55
```

11

```
tac aag aac agc tgc ccc agc gtg gac tcc atc gtc cgc agc gtc acc      366
Tyr Lys Asn Ser Cys Pro Ser Val Asp Ser Ile Val Arg Ser Val Thr
                60                  65                  70

tgg gcg cag gtc gcc gcc aac cct gcc ctc ccg gct cgc ctc ctc cgc      414
Trp Ala Gln Val Ala Ala Asn Pro Ala Leu Pro Ala Arg Leu Leu Arg
                75                  80                  85

ctc cac ttc cat gac tgc ttc gtc aag ggc tgc gac gcg tcg atc ctg      462
Leu His Phe His Asp Cys Phe Val Lys Gly Cys Asp Ala Ser Ile Leu
            90                  95                  100

ctg gac acc gcg cag agc gag aag acg gcg gcg ccg aac ctg tcg gtg      510
Leu Asp Thr Ala Gln Ser Glu Lys Thr Ala Ala Pro Asn Leu Ser Val
        105                 110                 115

ggc ggg tac gag gtg atc gac gcg atc aag gcg cag ctg gag agg gcg      558
Gly Gly Tyr Glu Val Ile Asp Ala Ile Lys Ala Gln Leu Glu Arg Ala
120                 125                 130                 135

tgc ccg ggc gtg gtg tcg tgc gcc gac atc gtg gcg ctg gcg gcg cgc      606
Cys Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg
                140                 145                 150

gac gcc gtg tcg tac cag ttc aag gcg tcg ctg tgg cag gtg gag acg      654
Asp Ala Val Ser Tyr Gln Phe Lys Ala Ser Leu Trp Gln Val Glu Thr
                155                 160                 165

ggg cgg cgc gac ggc acg gtg tcg ctg gcg tcc aac acg ggg gcg ctg      702
Gly Arg Arg Asp Gly Thr Val Ser Leu Ala Ser Asn Thr Gly Ala Leu
            170                 175                 180

ccg tcg ccc ttc gcg ggc ttc gcg ggc ctg ctg cag agc ttc tcg gac      750
Pro Ser Pro Phe Ala Gly Phe Ala Gly Leu Leu Gln Ser Phe Ser Asp
        185                 190                 195

cgg ggg ctg aac ctg acg gac ctc gtg gcg ctg tcg ggg gcg cac acc      798
Arg Gly Leu Asn Leu Thr Asp Leu Val Ala Leu Ser Gly Ala His Thr
200                 205                 210                 215

atc ggc gtg gca agc tgc tcc agc gtc acc ccg cgc ctg tac cag ggg      846
Ile Gly Val Ala Ser Cys Ser Ser Val Thr Pro Arg Leu Tyr Gln Gly
                220                 225                 230

aac gcc agc agc gtg gac ccg ctg ctg gac tcg gcc tac gcg cgg acg      894
Asn Ala Ser Ser Val Asp Pro Leu Leu Asp Ser Ala Tyr Ala Arg Thr
                235                 240                 245

ctc atg tcg tcg tgc ccc aac ccg tcg ccg gcg tcg gcc acc gtg gcg      942
Leu Met Ser Ser Cys Pro Asn Pro Ser Pro Ala Ser Ala Thr Val Ala
            250                 255                 260

ctg gac ggc ggc acg ccg ttc cgg ttc gac agc agt tac tac tcc agg      990
Leu Asp Gly Gly Thr Pro Phe Arg Phe Asp Ser Ser Tyr Tyr Ser Arg
        265                 270                 275
```

12

```
gtg cag cag aag cag ggc acg ctg gcc tcc gac gcc gcg ctg gcg cag        1038
Val Gln Gln Lys Gln Gly Thr Leu Ala Ser Asp Ala Ala Leu Ala Gln
280             285             290             295

aac gcc gcc gcc gcg cag atg gtg gcc gac ctc acc aac ccc atc aag        1086
Asn Ala Ala Ala Ala Gln Met Val Ala Asp Leu Thr Asn Pro Ile Lys
                300             305             310

ttc tac gcc gcc ttc tcc atg tcc atg aag aag atg ggc cgc gtc gac        1134
Phe Tyr Ala Ala Phe Ser Met Ser Met Lys Lys Met Gly Arg Val Asp
                315             320             325

gtg ctc acc ggc gcc aac ggc cag atc agg aag cag tgc cgc cag gtc        1182
Val Leu Thr Gly Ala Asn Gly Gln Ile Arg Lys Gln Cys Arg Gln Val
                330             335             340

aac acc tcc tga tcaacaaggc ctcacaggga ggggccatgg tttttccctc            1234
Asn Thr Ser *
        345

ttcgttcttc tctttttctg caccgcctgg tattattgtt ccatgcatcc ggtttcggct      1294
cggcttcggc tcggcgcgca tcaaatatat ttcgcccccg cgccgtgatt gagggccctc      1354
ctccgacgaa agaaatccat tgctttcttt gttatttata ttagtttact cactgtcctg      1414
tgttccattg tcttgccttg caaaaatgta agaaagatta aagatgtaag caaaaaaaaa      1474
aaaaaa                                                                 1480


<210> 10
<211> 346
<212> PRT
<213> Zea mays

<400> 10
Met Arg Gly Gln Thr Gln Thr Ala Ser Ala Gly Gly Arg Trp Arg Gly
1               5               10              15
Asp Gly Ala Ala Ala Trp Cys Trp Trp Trp Val Ala Val Val Leu Leu
                20              25              30
Leu Gly His Leu Pro Ser Cys Ala Arg Ala Gly Leu Leu Glu Ser Asn
            35              40              45
Pro Gly Leu Ala Tyr Asn Phe Tyr Lys Asn Ser Cys Pro Ser Val Asp
    50              55              60
Ser Ile Val Arg Ser Val Thr Trp Ala Gln Val Ala Ala Asn Pro Ala
65              70              75              80
Leu Pro Ala Arg Leu Leu Arg Leu His Phe His Asp Cys Phe Val Lys
                85              90              95
Gly Cys Asp Ala Ser Ile Leu Leu Asp Thr Ala Gln Ser Glu Lys Thr
            100             105             110
Ala Ala Pro Asn Leu Ser Val Gly Gly Tyr Glu Val Ile Asp Ala Ile
    115             120             125
Lys Ala Gln Leu Glu Arg Ala Cys Pro Gly Val Val Ser Cys Ala Asp
    130             135             140
Ile Val Ala Leu Ala Ala Arg Asp Ala Val Ser Tyr Gln Phe Lys Ala
145             150             155             160
Ser Leu Trp Gln Val Glu Thr Gly Arg Arg Asp Gly Thr Val Ser Leu
                165             170             175
Ala Ser Asn Thr Gly Ala Leu Pro Ser Pro Phe Ala Gly Phe Ala Gly
                180             185             190
Leu Leu Gln Ser Phe Ser Asp Arg Gly Leu Asn Leu Thr Asp Leu Val
```

13

```
                195                     200                     205
Ala Leu Ser Gly Ala His Thr Ile Gly Val Ala Ser Cys Ser Ser Val
        210                     215                     220
Thr Pro Arg Leu Tyr Gln Gly Asn Ala Ser Ser Val Asp Pro Leu Leu
225                     230                     235                     240
Asp Ser Ala Tyr Ala Arg Thr Leu Met Ser Ser Cys Pro Asn Pro Ser
                245                     250                     255
Pro Ala Ser Ala Thr Val Ala Leu Asp Gly Gly Thr Pro Phe Arg Phe
                260                     265                     270
Asp Ser Ser Tyr Tyr Ser Arg Val Gln Gln Lys Gln Gly Thr Leu Ala
                275                     280                     285
Ser Asp Ala Ala Leu Ala Gln Asn Ala Ala Ala Ala Gln Met Val Ala
        290                     295                     300
Asp Leu Thr Asn Pro Ile Lys Phe Tyr Ala Ala Phe Ser Met Ser Met
305                     310                     315                     320
Lys Lys Met Gly Arg Val Asp Val Leu Thr Gly Ala Asn Gly Gln Ile
                325                     330                     335
Arg Lys Gln Cys Arg Gln Val Asn Thr Ser
                340                     345


<210> 11
<211> 1183
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (60)...(1079)

<400> 11
ataacatcac catgacttga actaagcgat acagcaaact tgttgagact cagctgatc    59
atg ggt cga tac atg ttg gcg ccc gtg ttg gca gca ctc gtc gtc gcc   107
Met Gly Arg Tyr Met Leu Ala Pro Val Leu Ala Ala Leu Val Val Ala
 1               5                   10                  15

gcc tcc tca tcg gtg gca tca cac gcc tcg ccg ccg ggg aaa ctt gag   155
Ala Ser Ser Ser Val Ala Ser His Ala Ser Pro Pro Gly Lys Leu Glu
            20                  25                  30

gtc ggt ttc tac gag cac tcg tgc cca cag gcc gag gac atc gtg cgc   203
Val Gly Phe Tyr Glu His Ser Cys Pro Gln Ala Glu Asp Ile Val Arg
        35                  40                  45

aac gcc gtc cgc cgc ggc ata gcc cgc gag ccc ggc gtc ggc gcg ggg   251
Asn Ala Val Arg Arg Gly Ile Ala Arg Glu Pro Gly Val Gly Ala Gly
    50                  55                  60

ctc atc cgc atg cac ttc cac gac tgc ttc gtc cgg ggc tgc gac ggc   299
Leu Ile Arg Met His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly
65                  70                  75                  80

tcc atc ctc atc aac tcc acg ccg gac aac aag gcc gag aag gac tcc   347
Ser Ile Leu Ile Asn Ser Thr Pro Asp Asn Lys Ala Glu Lys Asp Ser
                85                  90                  95

gtg gcc aac aac ccc agc atg cgt ggc ttc gac gtc gtc gac gac gcc   395

14
```

```
          Val Ala Asn Asn Pro Ser Met Arg Gly Phe Asp Val Val Asp Asp Ala
                      100                 105                 110

          aag gcc gtc ctc gag gcg cac tgc ccg cgc acc gtc tcc tgc gcc gac        443
          Lys Ala Val Leu Glu Ala His Cys Pro Arg Thr Val Ser Cys Ala Asp
                      115                 120                 125

          atc gtc gcg ttc gca gcc cgt gac agc gcc tac ctc gcc ggc ggc ctg        491
          Ile Val Ala Phe Ala Ala Arg Asp Ser Ala Tyr Leu Ala Gly Gly Leu
                      130                 135                 140

          gac tac aag gtc ccg tct ggc cgc cgt gac ggc cgc gtg tcc aaa gag        539
          Asp Tyr Lys Val Pro Ser Gly Arg Arg Asp Gly Arg Val Ser Lys Glu
          145                 150                 155                 160

          gat gag gtg ctc gac aac aat gtc cct gcc ccg act gac gag gtc gac        587
          Asp Glu Val Leu Asp Asn Asn Val Pro Ala Pro Thr Asp Glu Val Asp
                          165                 170                 175

          gag ctc atc gag agc ttc aag cgc aag ggg ctc aac gcc gac gac atg        635
          Glu Leu Ile Glu Ser Phe Lys Arg Lys Gly Leu Asn Ala Asp Asp Met
                      180                 185                 190

          gtc acg ctc tct ggc gcg cac acc atc ggg cgc tcc cac tgc tcc tcg        683
          Val Thr Leu Ser Gly Ala His Thr Ile Gly Arg Ser His Cys Ser Ser
                      195                 200                 205

          ttc acg gag cgc ctc tac aac ttc agc ggg cag ctg ggg cgg acg gac        731
          Phe Thr Glu Arg Leu Tyr Asn Phe Ser Gly Gln Leu Gly Arg Thr Asp
                      210                 215                 220

          ccg tcc ctc gac cct gcc tac gct gag cac ctc aag atg cgc tgc cca        779
          Pro Ser Leu Asp Pro Ala Tyr Ala Glu His Leu Lys Met Arg Cys Pro
          225                 230                 235                 240

          tgg ccg tcc agc aac gac cag atg gac ccc acg gtg gtg ccg ctt gac        827
          Trp Pro Ser Ser Asn Asp Gln Met Asp Pro Thr Val Val Pro Leu Asp
                          245                 250                 255

          cca gtc acg ccg gcg acc ttc gac aac cag tac tac aag aac gtg ctg        875
          Pro Val Thr Pro Ala Thr Phe Asp Asn Gln Tyr Tyr Lys Asn Val Leu
                      260                 265                 270

          gcg cac aag gtc ctg ttc atc tcc gac aac aca ctg ctc gaa aac cca        923
          Ala His Lys Val Leu Phe Ile Ser Asp Asn Thr Leu Leu Glu Asn Pro
                      275                 280                 285

          tgg act gcc gga atg gtc cac ttc aac gcc gca gtc gag aag gca tgg        971
          Trp Thr Ala Gly Met Val His Phe Asn Ala Ala Val Glu Lys Ala Trp
                      290                 295                 300

          cag gtc aag ttc gcc aag gcc atg gtt aag atg ggc aag gtc cag gtg       1019
          Gln Val Lys Phe Ala Lys Ala Met Val Lys Met Gly Lys Val Gln Val
          305                 310                 315                 320

          ctc acc ggc gac gag gga gag atc agg gag aag tgc ttc gcc gtc aac       1067
          Leu Thr Gly Asp Glu Gly Glu Ile Arg Glu Lys Cys Phe Ala Val Asn
```

15

```
cca cac tac tag tcgtcaagtt tagctaatta ccccgcgaat tatgtttgtt        1119
Pro His Tyr  *


tatacgttcc atacatcaac attatgtaga gtgtttttcg ttctaaaaaa aaaaaaaaaa       1179
aaaa                                                                   1183
```

<210> 12
<211> 339
<212> PRT
<213> Zea mays

<400> 12

```
Met Gly Arg Tyr Met Leu Ala Pro Val Leu Ala Ala Leu Val Val Ala
1               5                   10                  15
Ala Ser Ser Ser Val Ala Ser His Ala Ser Pro Pro Gly Lys Leu Glu
            20                  25                  30
Val Gly Phe Tyr Glu His Ser Cys Pro Gln Ala Glu Asp Ile Val Arg
        35                  40                  45
Asn Ala Val Arg Arg Gly Ile Ala Arg Glu Pro Gly Val Gly Ala Gly
    50                  55                  60
Leu Ile Arg Met His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly
65                  70                  75                  80
Ser Ile Leu Ile Asn Ser Thr Pro Asp Asn Lys Ala Glu Lys Asp Ser
                85                  90                  95
Val Ala Asn Asn Pro Ser Met Arg Gly Phe Asp Val Val Asp Asp Ala
            100                 105                 110
Lys Ala Val Leu Glu Ala His Cys Pro Arg Thr Val Ser Cys Ala Asp
        115                 120                 125
Ile Val Ala Phe Ala Ala Arg Asp Ser Ala Tyr Leu Ala Gly Gly Leu
    130                 135                 140
Asp Tyr Lys Val Pro Ser Gly Arg Arg Asp Gly Arg Val Ser Lys Glu
145                 150                 155                 160
Asp Glu Val Leu Asp Asn Asn Val Pro Ala Pro Thr Asp Glu Val Asp
                165                 170                 175
Glu Leu Ile Glu Ser Phe Lys Arg Lys Gly Leu Asn Ala Asp Asp Met
            180                 185                 190
Val Thr Leu Ser Gly Ala His Thr Ile Gly Arg Ser His Cys Ser Ser
        195                 200                 205
Phe Thr Glu Arg Leu Tyr Asn Phe Ser Gly Gln Leu Gly Arg Thr Asp
    210                 215                 220
Pro Ser Leu Asp Pro Ala Tyr Ala Glu His Leu Lys Met Arg Cys Pro
225                 230                 235                 240
Trp Pro Ser Ser Asn Asp Gln Met Asp Pro Thr Val Val Pro Leu Asp
                245                 250                 255
Pro Val Thr Pro Ala Thr Phe Asp Asn Gln Tyr Tyr Lys Asn Val Leu
            260                 265                 270
Ala His Lys Val Leu Phe Ile Ser Asp Asn Thr Leu Leu Glu Asn Pro
        275                 280                 285
Trp Thr Ala Gly Met Val His Phe Asn Ala Ala Val Glu Lys Ala Trp
    290                 295                 300
Gln Val Lys Phe Ala Lys Ala Met Val Lys Met Gly Lys Val Gln Val
305                 310                 315                 320
Leu Thr Gly Asp Glu Gly Glu Ile Arg Glu Lys Cys Phe Ala Val Asn
                325                 330                 335
```

16

Pro His Tyr

<210> 13
<211> 1407
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (142)...(1185)

<400> 13
cgcgactagt acactgcctg ccaaacagct gagcagagta gagtagagca gagggcgaag   60
tgcagcgcag tgtgccccgt ctcggaacag cgcggaccac cagagcgtgc cgtccgtgc   120
cccacccctc cctctctatc c atg gcg gtc ccc cgc ggg tgc ctc ggg ctc   171
                        Met Ala Val Pro Arg Gly Cys Leu Gly Leu
                         1   5   10

ccc ctg gtc gcc gtg ctc ctc gcg tcc ctc tgc cgc ggc cag gcg gcg   219
Pro Leu Val Ala Val Leu Leu Ala Ser Leu Cys Arg Gly Gln Ala Ala
                15   20   25

gtg agg gag ctc aag gtc ggg tac tac gcc gag acg tgc ccg gag gcc   267
Val Arg Glu Leu Lys Val Gly Tyr Tyr Ala Glu Thr Cys Pro Glu Ala
            30   35   40

gag gac atc gtc cgt gag acc atg gcg cgc gcg cgc gca cgc gag gcc   315
Glu Asp Ile Val Arg Glu Thr Met Ala Arg Ala Arg Ala Arg Glu Ala
            45   50   55

cgc agc gtc gcc tcc gtc atg cgc ctc cag ttc cac gac tgc ttc gtc   363
Arg Ser Val Ala Ser Val Met Arg Leu Gln Phe His Asp Cys Phe Val
        60   65   70

aac ggg tgc gac ggc tcg gtg ctg atg gac gcc acg ccg acg atg ccc   411
Asn Gly Cys Asp Gly Ser Val Leu Met Asp Ala Thr Pro Thr Met Pro
    75   80   85   90

ggc gag aag gat gcg ctc tcc aac atc aac tcc ctg cgc tcg ttc gag   459
Gly Glu Lys Asp Ala Leu Ser Asn Ile Asn Ser Leu Arg Ser Phe Glu
                95   100   105

gtc gtc gac gag atc aag gac gcg ctg gag gag cgc tgc ccc gga gtg   507
Val Val Asp Glu Ile Lys Asp Ala Leu Glu Glu Arg Cys Pro Gly Val
            110   115   120

gtc tcc tgc gcc gac atc gtc atc atg gcc gcc cgc gac gcc gtc gtc   555
Val Ser Cys Ala Asp Ile Val Ile Met Ala Ala Arg Asp Ala Val Val
        125   130   135

ctg acc ggt ggg cct aac tgg gag gtg cgg ctc ggg cgc gag gac agc   603
Leu Thr Gly Gly Pro Asn Trp Glu Val Arg Leu Gly Arg Glu Asp Ser
    140   145   150

atg acg gcg agc cag gag gac gcg gac aac atc atg ccg agc ccg cgc   651

17

```
Met Thr Ala Ser Gln Glu Asp Ala Asp Asn Ile Met Pro Ser Pro Arg
155             160             165             170


gca aac gcg agc gct ctc atc cgg ctc ttc gcg ggg ctc aac ctc agc      699
Ala Asn Ala Ser Ala Leu Ile Arg Leu Phe Ala Gly Leu Asn Leu Ser
                175             180             185


gtc acc gac ctg gtc gcg ctc tcg ggc tcg cac tcc atc ggc gag gcc      747
Val Thr Asp Leu Val Ala Leu Ser Gly Ser His Ser Ile Gly Glu Ala
            190             195             200


cgc tgc ttc tcc atc gtc ttc cgc ctc tac aac cag tct gga tcc ggc      795
Arg Cys Phe Ser Ile Val Phe Arg Leu Tyr Asn Gln Ser Gly Ser Gly
        205             210             215


cgc ccc gac ccg cac atg gac acc gcc tac cgc cgc tcg ctc gac gca      843
Arg Pro Asp Pro His Met Asp Thr Ala Tyr Arg Arg Ser Leu Asp Ala
        220             225             230


ctc tgc ccc aag ggc ggc gac gag gag gtc acg gga ggc cta gac gcc      891
Leu Cys Pro Lys Gly Gly Asp Glu Glu Val Thr Gly Gly Leu Asp Ala
235             240             245             250


acc cca cgc gtc ttc gac aac cag tac ttc gag gac ctc gtc gcg ctc      939
Thr Pro Arg Val Phe Asp Asn Gln Tyr Phe Glu Asp Leu Val Ala Leu
                255             260             265


cgc ggc ttc ctc aac tcc gac cag acg ctc ttc tct gac aac acc agg      987
Arg Gly Phe Leu Asn Ser Asp Gln Thr Leu Phe Ser Asp Asn Thr Arg
            270             275             280


acc cgt cgc gtc gtc gag cgg ctc agc aag gac cag gac gcc ttc ttc     1035
Thr Arg Arg Val Val Glu Arg Leu Ser Lys Asp Gln Asp Ala Phe Phe
            285             290             295


agg gcc ttc atc gag ggg atg ata aag atg ggg gag ctc caa aac ccc     1083
Arg Ala Phe Ile Glu Gly Met Ile Lys Met Gly Glu Leu Gln Asn Pro
        300             305             310


agg aaa ggg gag ata cgg cgc aac tgt cgc gtt gct aac aac tcg ccg     1131
Arg Lys Gly Glu Ile Arg Arg Asn Cys Arg Val Ala Asn Asn Ser Pro
315             320             325             330


tgg caa cca agg acg ggg atg gcg tcc gga cag tcg aca tct gag ctc     1179
Trp Gln Pro Arg Thr Gly Met Ala Ser Gly Gln Ser Thr Ser Glu Leu
            335             340             345


cgg tga tgaggttggt gtttcagaag aaatcgagcc ctgatatggt actaatatgt     1235
Arg *


tgacatgcat tgttgttttt ttggtcgtgt gtaagttttg cacctaccta tggctgtggt     1295
gcccgagctg cgctcattgc tgacgtgggg aataattgag acattgtgcc ttagctccaa     1355
taacgttcaa tatatttatc ctttaaaaaa aaaaaaaaaa aaaaaaaaaa aa             1407
```

<210> 14
<211> 347

18

<212> PRT
<213> Zea mays

<400> 14
Met Ala Val Pro Arg Gly Cys Leu Gly Leu Pro Leu Val Ala Val Leu
1   5   10   15
Leu Ala Ser Leu Cys Arg Gly Gln Ala Ala Val Arg Glu Leu Lys Val
            20   25   30
Gly Tyr Tyr Ala Glu Thr Cys Pro Glu Ala Glu Asp Ile Val Arg Glu
        35   40   45
Thr Met Ala Arg Ala Arg Ala Arg Glu Ala Arg Ser Val Ala Ser Val
    50   55   60
Met Arg Leu Gln Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser
65   70   75   80
Val Leu Met Asp Ala Thr Pro Thr Met Pro Gly Glu Lys Asp Ala Leu
                85   90   95
Ser Asn Ile Asn Ser Leu Arg Ser Phe Glu Val Val Asp Glu Ile Lys
            100   105   110
Asp Ala Leu Glu Glu Arg Cys Pro Gly Val Val Ser Cys Ala Asp Ile
            115   120   125
Val Ile Met Ala Ala Arg Asp Ala Val Val Leu Thr Gly Gly Pro Asn
    130   135   140
Trp Glu Val Arg Leu Gly Arg Glu Asp Ser Met Thr Ala Ser Gln Glu
145   150   155   160
Asp Ala Asp Asn Ile Met Pro Ser Pro Arg Ala Asn Ala Ser Ala Leu
            165   170   175
Ile Arg Leu Phe Ala Gly Leu Asn Leu Ser Val Thr Asp Leu Val Ala
            180   185   190
Leu Ser Gly Ser His Ser Ile Gly Glu Ala Arg Cys Phe Ser Ile Val
        195   200   205
Phe Arg Leu Tyr Asn Gln Ser Gly Ser Gly Arg Pro Asp Pro His Met
    210   215   220
Asp Thr Ala Tyr Arg Arg Ser Leu Asp Ala Leu Cys Pro Lys Gly Gly
225   230   235   240
Asp Glu Glu Val Thr Gly Gly Leu Asp Ala Thr Pro Arg Val Phe Asp
                245   250   255
Asn Gln Tyr Phe Glu Asp Leu Val Ala Leu Arg Gly Phe Leu Asn Ser
            260   265   270
Asp Gln Thr Leu Phe Ser Asp Asn Thr Arg Thr Arg Arg Val Val Glu
        275   280   285
Arg Leu Ser Lys Asp Gln Asp Ala Phe Phe Arg Ala Phe Ile Glu Gly
    290   295   300
Met Ile Lys Met Gly Glu Leu Gln Asn Pro Arg Lys Gly Glu Ile Arg
305   310   315   320
Arg Asn Cys Arg Val Ala Asn Asn Ser Pro Trp Gln Pro Arg Thr Gly
                325   330   335
Met Ala Ser Gly Gln Ser Thr Ser Glu Leu Arg
            340   345

<210> 15
<211> 1565
<212> DNA
<213> Zea mays

<220>
<221> intron

19

<222> (315)...(491)

<400> 15
gcacaataat acagcaaagg aggctagcag aagtgcagga ttaataagct aagctagtag   60
aaattaagca aagcataggc acagccatgg ctacctcctc tggttcttgc cttattatta   120
gcctgttggt ggtggtggtg gcggcggcgc tgtcggcctc aacggcgtcg gcacagctgt   180
cgtcgacgtt ctacgacacg tcgtgcccca gcgcgatgtc caccatcagc agcggcgtga   240
actccgccgt ggcgcagcag gctcgtgtgg gggcgtcgct gctccggctc cacttccacg   300
actgcttcgt ccaagcaagt ctagctgtct cagatgcatc tatctatcta cttatatata   360
agcatgattt cctttctagc tagctagcat cgtcgtgcat tttaatttga agataaaaga   420
ttagcacgtc gtatatgcat gcgattaatt aaccaggagg catcatggtg aaatttctgg   480
tggtccacca gggctgcgac gcgtccattc tgctgaacga cacgtccggg gagcagaccc   540
agccgccgaa cctaactctg aacccgaggg ccttcgacgt cgtcaacagc atcaaggcgc   600
aggtggaggc ggcgtgcccg ggcgtcgtct cctgcgccga catcctcgcc gtcgccgccc   660
gcgacggagt tgtcgcgctc ggcgggcctt cgtggaccgt gcttctgggc agaagggact   720
cgaccggttc gttccctagc cagacaagcg acctcccacc tccgacgtcg agcctccaag   780
cactgttagc cgcgtacagc aagaagaacc tcgacgcgac cgacatggtc gctctctcag   840
gcgctcacac aatcgggcag gcccagtgct cgagcttcaa cggccacatc tacaacgaca   900
cgaacatcaa cgcggccttc gcgacgtcgc tcaaggccaa ctgccccatg tccggcggca   960
gcagcctggc gccgctggac accatgaccc cgaccgtgtt cgacaacgac tactacaaga   1020
acctgctgtc gcagaagggg ctgctgcact cggaccagga gctgttcaac aacggcagca   1080
ccgacagcac ggtcagcaac tttgcgtcca gcttcggccg ccttcaccag cgccttcacg   1140
gcggccatgg tgaagatggg gaacctcggc ccgctcaccg gaccagtgg gcagatcagg   1200
ctcacctgct ggaagctcaa ctcgtcctaa taattaagga cggacgtccg atagacgatc   1260
ctgcgcaatc gtatcgtacg tgcatgatac gcatacatct ggaaactact ataccaatgc   1320
aaacagagat ctatacgtac gagtatgtat aacgacgagt gatgtttgta tggatctacg   1380
tatgtaacaa ggacctctcg tagcgcaaag gcgcgcgttg ggagattaat taggtacaca   1440
agctattacc acattatata tcactctcat tgtggctaca tatctatatc tctgaggcca   1500
aatgcttggg tgtccagtac taattaataa taattcagtg cgtatgcaaa aaaaaaaaa   1560
aaaaa   1565

<210> 16
<211> 1388
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (87)...(1175)

<400> 16
gcacaataat acagcaaagg aggctagcag aagtgcagga ttaataagct aagctagtag   60
aaattaagca aagcataggc acagcc atg gct acc tcc tct ggt tct tgc ctt   113
                              Met Ala Thr Ser Ser Gly Ser Cys Leu
                             · 1   5

att att agc ctg ttg gtg gtg gtg gtg gcg gcg gcg ctg tcg gcc tca   161
Ile Ile Ser Leu Leu Val Val Val Val Ala Ala Ala Leu Ser Ala Ser
 10   15   20   25

acg gcg tcg gca cag ctg tcg tcg acg ttc tac gac acg tcg tgc ccc   209
Thr Ala Ser Ala Gln Leu Ser Ser Thr Phe Tyr Asp Thr Ser Cys Pro
                 30   35   40

agc gcg atg tcc acc atc agc agc ggc gtg aac tcc gcc gtg gcg cag   257
Ser Ala Met Ser Thr Ile Ser Ser Gly Val Asn Ser Ala Val Ala Gln
             45   50   55

20

```
cag gct cgt gtg ggg gcg tcg ctg ctc cgg ctc cac ttc cac gac tgc       305
Gln Ala Arg Val Gly Ala Ser Leu Leu Arg Leu His Phe His Asp Cys
        60              65              70

ttc gtc caa ggc tgc gac gcg tcc att ctg ctg aac gac acg tcc ggg       353
Phe Val Gln Gly Cys Asp Ala Ser Ile Leu Leu Asn Asp Thr Ser Gly
    75              80              85

gag cag acc cag ccg ccg aac cta act ctg aac ccg agg gcc ttc gac       401
Glu Gln Thr Gln Pro Pro Asn Leu Thr Leu Asn Pro Arg Ala Phe Asp
90              95              100             105

gtc gtc aac agc atc aag gcg cag gtg gag gcg gcg tgc ccg ggc gtc       449
Val Val Asn Ser Ile Lys Ala Gln Val Glu Ala Ala Cys Pro Gly Val
                110             115             120

gtc tcc tgc gcc gac atc ctc gcc gtc gcc gcc cgc gac gga gtt gtc       497
Val Ser Cys Ala Asp Ile Leu Ala Val Ala Ala Arg Asp Gly Val Val
        125             130             135

gcg ctc ggc ggg cct tcg tgg acc gtg ctt ctg ggc aga agg gac tcg       545
Ala Leu Gly Gly Pro Ser Trp Thr Val Leu Leu Gly Arg Arg Asp Ser
        140             145             150

acc ggt tcg ttc cct agc cag aca agc gac ctc cca cct ccg acg tcg       593
Thr Gly Ser Phe Pro Ser Gln Thr Ser Asp Leu Pro Pro Pro Thr Ser
    155             160             165

agc ctc caa gca ctg tta gcc gcg tac agc aag aag aac ctc gac gcg       641
Ser Leu Gln Ala Leu Leu Ala Ala Tyr Ser Lys Lys Asn Leu Asp Ala
170             175             180             185

acc gac atg gtc gct ctc tca ggc gct cac aca atc ggg cag gcc cag       689
Thr Asp Met Val Ala Leu Ser Gly Ala His Thr Ile Gly Gln Ala Gln
            190             195             200

tgc tcg agc ttc aac ggc cac atc tac aac gac acg aac atc aac gcg       737
Cys Ser Ser Phe Asn Gly His Ile Tyr Asn Asp Thr Asn Ile Asn Ala
            205             210             215

gcc ttc gcg acg tcg ctc aag gcc aac tgc ccc atg tcc ggc ggc agc       785
Ala Phe Ala Thr Ser Leu Lys Ala Asn Cys Pro Met Ser Gly Gly Ser
            220             225             230

agc ctg gcg ccg ctg gac acc atg acc ccg acc gtg ttc gac aac gac       833
Ser Leu Ala Pro Leu Asp Thr Met Thr Pro Thr Val Phe Asp Asn Asp
    235             240             245

tac tac aag aac ctg ctg tcg cag aag ggg ctg ctg cac tcg gac cag       881
Tyr Tyr Lys Asn Leu Leu Ser Gln Lys Gly Leu Leu His Ser Asp Gln
250             255             260             265

gag ctg ttc aac aac ggc agc acc gac agc acg gtc agc aac ttt gcg       929
Glu Leu Phe Asn Asn Gly Ser Thr Asp Ser Thr Val Ser Asn Phe Ala
            270             275             280
```

21

```
tcc agc ttc ggc cgc ctt cac cag cgc ctt cac ggc ggc cat ggt gaa      977
Ser Ser Phe Gly Arg Leu His Gln Arg Leu His Gly Gly His Gly Glu
            285                 290                 295

gat ggg gaa cct cgg ccc gct cac cgg gac cag tgg gca gat cag gct     1025
Asp Gly Glu Pro Arg Pro Ala His Arg Asp Gln Trp Ala Asp Gln Ala
            300                 305                 310

cac ctg ctg gaa gct caa ctc gtc cta ata att aag gac gga cgt ccg     1073
His Leu Leu Glu Ala Gln Leu Val Leu Ile Ile Lys Asp Gly Arg Pro
            315                 320                 325

ata gac gat cct gcg caa tcg tat cgt acg tgc atg ata cgc ata cat     1121
Ile Asp Asp Pro Ala Gln Ser Tyr Arg Thr Cys Met Ile Arg Ile His
330                 335                 340                 345

ctg gaa act act ata cca atg caa aca gag atc tat acg tac gag tat     1169
Leu Glu Thr Thr Ile Pro Met Gln Thr Glu Ile Tyr Thr Tyr Glu Tyr
                350                 355                 360

gta taa cgacgagtga tgtttgtatg gatctacgta tgtaacaagg acctctcgta     1225
Val  *


gcgcaaaggc gcgcgttggg agattaatta ggtacacaag ctattaccac attatatatc    1285
actctcattg tggctacata tctatatctc tgaggccaaa tgcttgggtg tccagtacta    1345
attaataata attcagtgcg tatgcaaaaa aaaaaaaaaa aaa                       1388

<210> 17
<211> 362
<212> PRT
<213> Zea mays

<400> 17
Met Ala Thr Ser Ser Gly Ser Cys Leu Ile Ile Ser Leu Leu Val Val
 1               5                  10                  15
Val Val Ala Ala Ala Leu Ser Ala Ser Thr Ala Ser Ala Gln Leu Ser
            20                  25                  30
Ser Thr Phe Tyr Asp Thr Ser Cys Pro Ser Ala Met Ser Thr Ile Ser
            35                  40                  45
Ser Gly Val Asn Ser Ala Val Ala Gln Gln Ala Arg Val Gly Ala Ser
    50                  55                  60
Leu Leu Arg Leu His Phe His Asp Cys Phe Val Gln Gly Cys Asp Ala
65                  70                  75                  80
Ser Ile Leu Leu Asn Asp Thr Ser Gly Glu Gln Thr Gln Pro Pro Asn
                85                  90                  95
Leu Thr Leu Asn Pro Arg Ala Phe Asp Val Val Asn Ser Ile Lys Ala
                100                 105                 110
Gln Val Glu Ala Ala Cys Pro Gly Val Val Ser Cys Ala Asp Ile Leu
            115                 120                 125
Ala Val Ala Ala Arg Asp Gly Val Val Ala Leu Gly Gly Pro Ser Trp
            130                 135                 140
Thr Val Leu Leu Gly Arg Arg Asp Ser Thr Gly Ser Phe Pro Ser Gln
145                 150                 155                 160
Thr Ser Asp Leu Pro Pro Pro Thr Ser Ser Leu Gln Ala Leu Leu Ala
                165                 170                 175
Ala Tyr Ser Lys Lys Asn Leu Asp Ala Thr Asp Met Val Ala Leu Ser
```

22

```
                 180                    185                    190
Gly Ala His Thr Ile Gly Gln Ala Gln Cys Ser Ser Phe Asn Gly His
        195                    200                    205
Ile Tyr Asn Asp Thr Asn Ile Asn Ala Ala Phe Ala Thr Ser Leu Lys
    210                    215                    220
Ala Asn Cys Pro Met Ser Gly Gly Ser Ser Leu Ala Pro Leu Asp Thr
225                    230                    235                    240
Met Thr Pro Thr Val Phe Asp Asn Asp Tyr Tyr Lys Asn Leu Leu Ser
                245                    250                    255
Gln Lys Gly Leu Leu His Ser Asp Gln Glu Leu Phe Asn Asn Gly Ser
            260                    265                    270
Thr Asp Ser Thr Val Ser Asn Phe Ala Ser Ser Phe Gly Arg Leu His
            275                    280                    285
Gln Arg Leu His Gly Gly His Gly Glu Asp Gly Glu Pro Arg Pro Ala
        290                    295                    300
His Arg Asp Gln Trp Ala Asp Gln Ala His Leu Leu Glu Ala Gln Leu
305                    310                    315                    320
Val Leu Ile Ile Lys Asp Gly Arg Pro Ile Asp Asp Pro Ala Gln Ser
                325                    330                    335
Tyr Arg Thr Cys Met Ile Arg Ile His Leu Glu Thr Thr Ile Pro Met
            340                    345                    350
Gln Thr Glu Ile Tyr Thr Tyr Glu Tyr Val
            355                    360


<210> 18
<211> 1467
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (109)...(1095)

<400> 18
gcgacaggac gagactcgca gctagctgac acggccgaga agcagcttgc attgcaggcg      60
tagtacgtac ccagcagcag ctagcactag cagtccatcg gagcgacg atg gtg aga     117
                                                      Met Val Arg
                                                        1

agg acg gtg ctg gcg gcg ctg ctg gtg gcc gcc gcc ctc gcc ggc ggc     165
Arg Thr Val Leu Ala Ala Leu Leu Val Ala Ala Ala Leu Ala Gly Gly
      5                  10                  15

gcg cgg gcg cag ctc aag gag ggg ttc tac gac tac tcc tgc cca cag     213
Ala Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser Cys Pro Gln
 20                  25                  30                  35

gcg gag aag atc gtc aag gac tac gtg aag gcg cac atc ccc cac gcg     261
Ala Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile Pro His Ala
                40                  45                  50

ccc gac gtc gcc tcc acc ctg ctc cgc acc cac ttc cac gac tgc ttc     309
Pro Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His Asp Cys Phe
                55                  60                  65

gtc agg ggc tgc gac gcg tca gtg ctg ctc aac gcg acg ggc ggc agc     357
```

23

```
Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr Gly Gly Ser
        70                  75                  80

gag gcg gag aag gac gcg gcg ccc aac ctg acg ctg cgc ggc ttc ggc        405
Glu Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg Gly Phe Gly
        85                  90                  95

ttc atc gac cgc atc aag gcg ctg ctc gag aag gag tgc ccc ggc gtg        453
Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys Pro Gly Val
100                 105                 110                 115

gtg tcc tgc gcc gac atc gtc gcg ctc gcc gcc cgc gac tcc gtc ggc        501
Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp Ser Val Gly
                120                 125                 130

gtc atc ggc ggt ccg ttc tgg agc gtg ccg acg ggg agg cgc gac ggc        549
Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg Arg Asp Gly
                135                 140                 145

acc gtg tcc atc aag cag gag gcg ctg gac cag atc ccc gcg ccc acc        597
Thr Val Ser Ile Lys Gln Glu Ala Leu Asp Gln Ile Pro Ala Pro Thr
                150                 155                 160

atg aac ttc acc caa ctc ctc cag tcc ttc cag aac aag agc ctc aac        645
Met Asn Phe Thr Gln Leu Leu Gln Ser Phe Gln Asn Lys Ser Leu Asn
                165                 170                 175

ctc gcc gac ctc gtc tgg ctc tca ggg gct cac acg atc ggc atc tcc        693
Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile Gly Ile Ser
180                 185                 190                 195

caa tgc aac tcc ttc agc gag cgc ctg tac aac ttc acg ggg cgc ggc        741
Gln Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr Gly Arg Gly
                200                 205                 210

ggg ccc gac gac gcg gac ccg tcg ctg gac ccg ctg tac gcc gcg aag        789
Gly Pro Asp Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr Ala Ala Lys
                215                 220                 225

ttg cgg ctc aag tgc aag acg ctg acg gac aac acg acg atc gtg gag        837
Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr Ile Val Glu
                230                 235                 240

atg gac ccc ggc agc ttc cgc acc ttc gac ctg agc tac tac cgc ggc        885
Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr Tyr Arg Gly
                245                 250                 255

gtg ctc aag cgg cgg ggc ctg ttc cag tcc gac gcc gcg ctc atc acc        933
Val Leu Lys Arg Arg Gly Leu Phe Gln Ser Asp Ala Ala Leu Ile Thr
260                 265                 270                 275

gac gcc gcc tcc aag gcc gac atc ctc agc gtg atc aac gcg ccg ccc        981
Asp Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn Ala Pro Pro
                280                 285                 290

gag gtg ttc ttc cag gtc ttc gcg ggc tcc atg gtc aag atg ggc gcc       1029
Glu Val Phe Phe Gln Val Phe Ala Gly Ser Met Val Lys Met Gly Ala
```

24

```
atc gag gtc aag acc ggc tcc gag ggc gag atc agg aag cac tgc gcc     1077
Ile Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys His Cys Ala
        310                 315                 320

ctc gtc aac aag cac tag gcggcggaat tcatgcggga gatggctcca           1125
Leu Val Asn Lys His  *
        325

ttgctcgcaa aaaaatcctt gtgagacaca caacatgctc tgcatctgca ggcgttgtcg  1185
tcaccttggt ggacgtagta catcggtgca tggattatct gttgtttaat ttgtacgttc  1245
agttcattct gtttcttgta ttcttttggt tcctttcctc ttgttattc atggatgatg   1305
aggtgtttct gttttattct ctggttcagc tgtaaccatg taacatgtaa ggtgcgcgtt   1365
ttgtcctcgt gatctctgca actgtattta ttttaatgga tggtatacat ggagatatga   1425
tcatgataat aacaataagg tgattacaaa aaaaaaaaaa aa                       1467
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<210> 19
<211> 328
<212> PRT
<213> Zea mays

<400> 19

```
Met Val Arg Arg Thr Val Leu Ala Ala Leu Leu Val Ala Ala Ala Leu
 1               5                  10                  15
Ala Gly Gly Ala Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser
            20                  25                  30
Cys Pro Gln Ala Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile
        35                  40                  45
Pro His Ala Pro Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His
        50                  55                  60
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr
65                  70                  75                  80
Gly Gly Ser Glu Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg
                85                  90                  95
Gly Phe Gly Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys
            100                 105                 110
Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp
            115                 120                 125
Ser Val Gly Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg
        130                 135                 140
Arg Asp Gly Thr Val Ser Ile Lys Gln Glu Ala Leu Asp Gln Ile Pro
145                 150                 155                 160
Ala Pro Thr Met Asn Phe Thr Gln Leu Leu Gln Ser Phe Gln Asn Lys
                165                 170                 175
Ser Leu Asn Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile
            180                 185                 190
Gly Ile Ser Gln Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr
        195                 200                 205
Gly Arg Gly Gly Pro Asp Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr
        210                 215                 220
Ala Ala Lys Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr
225                 230                 235                 240
Ile Val Glu Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr
                245                 250                 255
Tyr Arg Gly Val Leu Lys Arg Arg Gly Leu Phe Gln Ser Asp Ala Ala
            260                 265                 270
```

```
Leu Ile Thr Asp Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn
        275                 280                 285
Ala Pro Pro Glu Val Phe Phe Gln Val Phe Ala Gly Ser Met Val Lys
        290                 295                 300
Met Gly Ala Ile Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys
305                 310                 315                 320
His Cys Ala Leu Val Asn Lys His
                325


<210> 20
<211> 1522
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (187)...(1170)


<400> 20
ggctagctag ctatctagag agctcatcat atcgctgctc gctctcatcc accattatag      60
agaagagcag atcgagctgc agctggcaga ggccgagttg ttgctagcta gctcctgctt     120
gctaaatttg catcgtatcc gatccattcc atgaagaagt cgtcgatgat ggcgcccatg     180
acgatc atg gcg aga gtt gcc gct gtg ctc gtc ctc tcg tcg gct gcc       228
        Met Ala Arg Val Ala Ala Val Leu Val Leu Ser Ser Ala Ala
         1               5                  10

atg gct tcc gcc gca gga gca gct ggg ctg gac atg aat ttc tac ggc      276
Met Ala Ser Ala Ala Gly Ala Ala Gly Leu Asp Met Asn Phe Tyr Gly
 15              20              25                  30

agc acg tgc ccg cgc gtg gag gcc atc gtc aag gag gag atg gtg gcg      324
Ser Thr Cys Pro Arg Val Glu Ala Ile Val Lys Glu Glu Met Val Ala
                35              40                  45

acc ctc aag gcg gcg ccg acg ctg gcc ggc ccg ctg ctc cgc ctc cat      372
Thr Leu Lys Ala Ala Pro Thr Leu Ala Gly Pro Leu Leu Arg Leu His
            50              55              60

ttc cac gac tgc ttc gtc agg ggc tgc gac gcc tcc gtg ctc ctg gac      420
Phe His Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asp
            65              70              75

tcg act ccc acc agc acg gcg gag aag gac gcc acc ccg aac ctc acc      468
Ser Thr Pro Thr Ser Thr Ala Glu Lys Asp Ala Thr Pro Asn Leu Thr
        80              85                  90

ctc cgg ggc ttc ggc tcc gtg cag cgc gtc aag gac cgg ctg gag gaa      516
Leu Arg Gly Phe Gly Ser Val Gln Arg Val Lys Asp Arg Leu Glu Glu
 95              100             105                 110

gcg tgc ccg ggc aac gtc tcc tgc gcc gac gtc ctg gcg ctc atg gcg      564
Ala Cys Pro Gly Asn Val Ser Cys Ala Asp Val Leu Ala Leu Met Ala
                115             120                 125

cgc gac gcc gtc gtg ctg gcc aac ggg ccc tcc tgg ccc gtc gcg ctg      612
Arg Asp Ala Val Val Leu Ala Asn Gly Pro Ser Trp Pro Val Ala Leu
```

26

```
              130                   135                   140
ggc cgc cgc tac ggc cgc gtc tcc ctc gcc aac gag acc aac cag ctg      660
Gly Arg Arg Tyr Gly Arg Val Ser Leu Ala Asn Glu Thr Asn Gln Leu
        145                   150                   155

ccc ccg ccc acc gcc aac ttc acc cgc ctc gtc agc atg ttc gcc gcc      708
Pro Pro Pro Thr Ala Asn Phe Thr Arg Leu Val Ser Met Phe Ala Ala
        160                   165                   170

aag ggc ctc tcc gtc agg gac ctc gtc gtg ctc tcc ggc ggc cac acc      756
Lys Gly Leu Ser Val Arg Asp Leu Val Val Leu Ser Gly Gly His Thr
175                   180                   185                   190

ctc ggc acc gcg cac tgc aac ctc ttc agc gac cgc ctc tac aac ttc      804
Leu Gly Thr Ala His Cys Asn Leu Phe Ser Asp Arg Leu Tyr Asn Phe
                  195                   200                   205

acc ggc gcc aac agc ctc gcc gac gtc gac ccg gcg ctc gac gcc gcc      852
Thr Gly Ala Asn Ser Leu Ala Asp Val Asp Pro Ala Leu Asp Ala Ala
              210                   215                   220

tac ctc gcc cgc ctc agg tcc agg tgc cgg agc ctc gcc gac aac acc      900
Tyr Leu Ala Arg Leu Arg Ser Arg Cys Arg Ser Leu Ala Asp Asn Thr
        225                   230                   235

acg ctc aac gag atg gac ccc ggc agc ttc ctc agc ttc gac tcc agc      948
Thr Leu Asn Glu Met Asp Pro Gly Ser Phe Leu Ser Phe Asp Ser Ser
        240                   245                   250

tac tac agc ctg gtg gcc agg cgc cgg ggg ctc ttc cac tcc gac gcc      996
Tyr Tyr Ser Leu Val Ala Arg Arg Arg Gly Leu Phe His Ser Asp Ala
255                   260                   265                   270

gcg ctg ctc acc gac ccg gcc acc agg gcg tac gtc cag cgc cag gcc     1044
Ala Leu Leu Thr Asp Pro Ala Thr Arg Ala Tyr Val Gln Arg Gln Ala
                  275                   280                   285

acg ggg ctc ttc acc gcc gag ttc ttc cgc gac ttc gcc gac tcc atg     1092
Thr Gly Leu Phe Thr Ala Glu Phe Phe Arg Asp Phe Ala Asp Ser Met
                  290                   295                   300

gtc aag atg tcc acc atc gac gtg ctc acc ggc cag cag cag ggc gag     1140
Val Lys Met Ser Thr Ile Asp Val Leu Thr Gly Gln Gln Gln Gly Glu
        305                   310                   315

atc aga aag aaa tgc aac ctc gtc aac tga caaataatac gtacattaat       1190
Ile Arg Lys Lys Cys Asn Leu Val Asn  *
        320                   325

tgctgctggt tttgacgatg cctttcactt acgttcatcc acttaattca tgcatccatg   1250
ttggttgggt tcattcaatt attatattcg ttgcttacct ttacttttgc ttggttaatc   1310
ttaattaaat cgtgtgagtt ttcttttctt ttcttgagta tatatatgta tgtacgtaga   1370
gcgtgatgag tgccttttca agtttattgt tttttactt tttcctctcg tgcatatggt    1430
tcaaatccat gatgatgatg taatgcgcat gtaattaata atgacaatca agtcaataaa   1490
cacacatgca atttaaaaaa aaaaaaaaaa aa                                  1522
```

27

<210> 21
<211> 327
<212> PRT
<213> Zea mays

<400> 21
Met Ala Arg Val Ala Ala Val Leu Val Leu Ser Ser Ala Ala Met Ala
1   5   10   15
Ser Ala Ala Gly Ala Ala Gly Leu Asp Met Asn Phe Tyr Gly Ser Thr
            20   25   30
Cys Pro Arg Val Glu Ala Ile Val Lys Glu Glu Met Val Ala Thr Leu
            35   40   45
Lys Ala Ala Pro Thr Leu Ala Gly Pro Leu Leu Arg Leu His Phe His
    50   55   60
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asp Ser Thr
65   70   75   80
Pro Thr Ser Thr Ala Glu Lys Asp Ala Thr Pro Asn Leu Thr Leu Arg
                85   90   95
Gly Phe Gly Ser Val Gln Arg Val Lys Asp Arg Leu Glu Glu Ala Cys
            100   105   110
Pro Gly Asn Val Ser Cys Ala Asp Val Leu Ala Leu Met Ala Arg Asp
            115   120   125
Ala Val Val Leu Ala Asn Gly Pro Ser Trp Pro Val Ala Leu Gly Arg
    130   135   140
Arg Tyr Gly Arg Val Ser Leu Ala Asn Glu Thr Asn Gln Leu Pro Pro
145   150   155   160
Pro Thr Ala Asn Phe Thr Arg Leu Val Ser Met Phe Ala Ala Lys Gly
                165   170   175
Leu Ser Val Arg Asp Leu Val Val Leu Ser Gly Gly His Thr Leu Gly
            180   185   190
Thr Ala His Cys Asn Leu Phe Ser Asp Arg Leu Tyr Asn Phe Thr Gly
            195   200   205
Ala Asn Ser Leu Ala Asp Val Asp Pro Ala Leu Asp Ala Ala Tyr Leu
    210   215   220
Ala Arg Leu Arg Ser Arg Cys Arg Ser Leu Ala Asp Asn Thr Thr Leu
225   230   235   240
Asn Glu Met Asp Pro Gly Ser Phe Leu Ser Phe Asp Ser Ser Tyr Tyr
                245   250   255
Ser Leu Val Ala Arg Arg Arg Gly Leu Phe His Ser Asp Ala Ala Leu
            260   265   270
Leu Thr Asp Pro Ala Thr Arg Ala Tyr Val Gln Arg Gln Ala Thr Gly
            275   280   285
Leu Phe Thr Ala Glu Phe Phe Arg Asp Phe Ala Asp Ser Met Val Lys
    290   295   300
Met Ser Thr Ile Asp Val Leu Thr Gly Gln Gln Gln Gly Glu Ile Arg
305   310   315   320
Lys Lys Cys Asn Leu Val Asn
                325

<210> 22
<211> 1451
<212> DNA
<213> Zea mays

<220>
<221> CDS

28

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ggaaacagct attgaccatg attacgccca agttctatac gactcactat aggaaagctt     60
gtacgcctgc aggtaccggt cccggaattc ccgggtcgac ccacgcgtcc gcacctgata    120
ttttttccga cggacacaca agcatatata catacacgcc gacataggg atg atg gct    178
                                                       Met Met Ala
                                                        1
```
```
tcc tct agt cct cag cgt gca gcc ggc gcc gcc gtc gcc ggc gtg ctg     226
Ser Ser Ser Pro Gln Arg Ala Ala Gly Ala Ala Val Ala Gly Val Leu
     5               10                  15
```
```
ctg gtg gcg gct gcc gcc ctg tgc tcg tgc ggc gcc atg gcg cag ctg     274
Leu Val Ala Ala Ala Ala Leu Cys Ser Cys Gly Ala Met Ala Gln Leu
 20               25                  30                  35
```
```
acc gcg gac tac tac gac tgc aca tgc cct gac gcc tac aac atc gtg     322
Thr Ala Asp Tyr Tyr Asp Cys Thr Cys Pro Asp Ala Tyr Asn Ile Val
                 40                  45                  50
```
```
aag cag gtc ctg atc gag gcg cac aag tcc gac gtg cgc atc tac gcc     370
Lys Gln Val Leu Ile Glu Ala His Lys Ser Asp Val Arg Ile Tyr Ala
                 55                  60                  65
```
```
agc ctc acc tgc ctc cac ttc cac gac tgc ttc gtc cag ggc tgc gat     418
Ser Leu Thr Cys Leu His Phe His Asp Cys Phe Val Gln Gly Cys Asp
             70                  75                  80
```
```
ggc tcg gtg ctc ctg gac gcc gtt ccg ggg gtg gcc aac tcc act gag     466
Gly Ser Val Leu Leu Asp Ala Val Pro Gly Val Ala Asn Ser Thr Glu
         85                  90                  95
```
```
aag ctg gcg ccg gcc aac aac aac tcg gcg cga ggg ttc ccg gtg gtg     514
Lys Leu Ala Pro Ala Asn Asn Asn Ser Ala Arg Gly Phe Pro Val Val
100                 105                 110                 115
```
```
gac aaa gtg aag gcg gcg ctg gag gac gcc tgc ccc ggc gtc gtc tcc     562
Asp Lys Val Lys Ala Ala Leu Glu Asp Ala Cys Pro Gly Val Val Ser
                 120                 125                 130
```
```
tgc gcc gac atc ctc gcc ctc gcc gca gag atc tcg gtc gaa ctg tcc     610
Cys Ala Asp Ile Leu Ala Leu Ala Ala Glu Ile Ser Val Glu Leu Ser
                 135                 140                 145
```
```
gga gga cca aag tgg gca gtg ctt ctt ggg agg cta gac agc aag aag     658
Gly Gly Pro Lys Trp Ala Val Leu Leu Gly Arg Leu Asp Ser Lys Lys
             150                 155                 160
```
```
gcc gac ttc aag agc gcg gag aac ctg ccg tcg ccg ttc gac aac ctg     706
Ala Asp Phe Lys Ser Ala Glu Asn Leu Pro Ser Pro Phe Asp Asn Leu
             165                 170                 175
```
```
acg gtg ctg gag cag aag ttc gcg gcc gtg ggc ctc cac acc gtg gac     754
Thr Val Leu Glu Gln Lys Phe Ala Ala Val Gly Leu His Thr Val Asp
180                 185                 190                 195
```

29

```
ctg gtg gcc ctc tcg gga gct cac acg ttc ggg cgg gtc cag tgc cag        802
Leu Val Ala Leu Ser Gly Ala His Thr Phe Gly Arg Val Gln Cys Gln
            200                 205                 210

ttc gtc acg ggg cgg ctg tac aac ttc agc ggc acg aac cgg ccg gac        850
Phe Val Thr Gly Arg Leu Tyr Asn Phe Ser Gly Thr Asn Arg Pro Asp
            215                 220                 225

ccc acg ctc aac tcc ggc tac cgg gcg ttc ctg gcc cag agg tgc ccc        898
Pro Thr Leu Asn Ser Gly Tyr Arg Ala Phe Leu Ala Gln Arg Cys Pro
            230                 235                 240

cag aac ggc agc ccc tcg gcc ctc aac gac ctg gac ccc acg acg ccg        946
Gln Asn Gly Ser Pro Ser Ala Leu Asn Asp Leu Asp Pro Thr Thr Pro
            245                 250                 255

aac ctg ttc gac aac cac tac tac acc aac ctg gag gtg aac cgg ggc        994
Asn Leu Phe Asp Asn His Tyr Tyr Thr Asn Leu Glu Val Asn Arg Gly
260                 265                 270                 275

ttc ctc ggc tcg gac cag gag ctc aag tcg gcg ccg cag gcg cag ggc       1042
Phe Leu Gly Ser Asp Gln Glu Leu Lys Ser Ala Pro Gln Ala Gln Gly
            280                 285                 290

gtc acc gcg ccc gtc gtc gac cag ttc gcc acc agc cag gcc gcc ttc       1090
Val Thr Ala Pro Val Val Asp Gln Phe Ala Thr Ser Gln Ala Ala Phe
            295                 300                 305

ttc agc agc ttc gcg cag tcc atg atc aac atg ggc aac atc cag ccg       1138
Phe Ser Ser Phe Ala Gln Ser Met Ile Asn Met Gly Asn Ile Gln Pro
            310                 315                 320

ctc acc gac ccg gcc aag gga gag gtc cgc tgc gac tgc cgg gtg gct       1186
Leu Thr Asp Pro Ala Lys Gly Glu Val Arg Cys Asp Cys Arg Val Ala
            325                 330                 335

aat gat gat taa tccacgacga cgacgtgtgt agttagaaac ggacgtgaat           1238
Asn Asp Asp  *
340

gcatgtgcat gtgcccggcc gggtcgttag tacaccgaca agcaagagtg cactagcgct     1298
atggatcgga ctatatggtg cacaactgca catgcatgca tataatatca gggcctcgtc     1358
gtttcgaatt gtttgctgtc gacttcaatt aatagtttct cataaatgtg caataaagag     1418
gaacccaatt tcttcattaa aaaaaaaaaa aaa                                   1451

<210> 23
<211> 342
<212> PRT
<213> Zea mays

<400> 23
Met Met Ala Ser Ser Ser Pro Gln Arg Ala Ala Gly Ala Ala Val Ala
 1               5                  10                  15
Gly Val Leu Leu Val Ala Ala Ala Ala Leu Cys Ser Cys Gly Ala Met
            20                  25                  30
Ala Gln Leu Thr Ala Asp Tyr Tyr Asp Cys Thr Cys Pro Asp Ala Tyr
            35                  40                  45
```

30

```
Asn Ile Val Lys Gln Val Leu Ile Glu Ala His Lys Ser Asp Val Arg
    50                  55                  60
Ile Tyr Ala Ser Leu Thr Cys Leu His Phe His Asp Cys Phe Val Gln
65                  70                  75                  80
Gly Cys Asp Gly Ser Val Leu Leu Asp Ala Val Pro Gly Val Ala Asn
                85                  90                  95
Ser Thr Glu Lys Leu Ala Pro Ala Asn Asn Asn Ser Ala Arg Gly Phe
            100                 105                 110
Pro Val Val Asp Lys Val Lys Ala Ala Leu Glu Asp Ala Cys Pro Gly
            115                 120                 125
Val Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Glu Ile Ser Val
            130                 135                 140
Glu Leu Ser Gly Gly Pro Lys Trp Ala Val Leu Leu Gly Arg Leu Asp
145                 150                 155                 160
Ser Lys Lys Ala Asp Phe Lys Ser Ala Glu Asn Leu Pro Ser Pro Phe
                165                 170                 175
Asp Asn Leu Thr Val Leu Glu Gln Lys Phe Ala Ala Val Gly Leu His
                180                 185                 190
Thr Val Asp Leu Val Ala Leu Ser Gly Ala His Thr Phe Gly Arg Val
            195                 200                 205
Gln Cys Gln Phe Val Thr Gly Arg Leu Tyr Asn Phe Ser Gly Thr Asn
    210                 215                 220
Arg Pro Asp Pro Thr Leu Asn Ser Gly Tyr Arg Ala Phe Leu Ala Gln
225                 230                 235                 240
Arg Cys Pro Gln Asn Gly Ser Pro Ser Ala Leu Asn Asp Leu Asp Pro
                245                 250                 255
Thr Thr Pro Asn Leu Phe Asp Asn His Tyr Tyr Thr Asn Leu Glu Val
                260                 265                 270
Asn Arg Gly Phe Leu Gly Ser Asp Gln Glu Leu Lys Ser Ala Pro Gln
                275                 280                 285
Ala Gln Gly Val Thr Ala Pro Val Val Asp Gln Phe Ala Thr Ser Gln
    290                 295                 300
Ala Ala Phe Phe Ser Ser Phe Ala Gln Ser Met Ile Asn Met Gly Asn
305                 310                 315                 320
Ile Gln Pro Leu Thr Asp Pro Ala Lys Gly Glu Val Arg Cys Asp Cys
                325                 330                 335
Arg Val Ala Asn Asp Asp
                340


<210> 24
<211> 1334
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (62)...(1075)

<400> 24
actttgttgc tgtttttatt cgtttgtcac ataagcagtg gtggtcggtc ggccggcgac      60
a atg agc ggc cgt gtg ttc gtc ctg gcc gct gcc ttc ggc gtg ctg ctc     109
  Met Ser Gly Arg Val Phe Val Leu Ala Ala Ala Phe Gly Val Leu Leu
   1               5                   10                  15

gcc gca gcc gcc gtg tcc tcg agg ccc gtc ctg act ccg ctg ggt act     157
Ala Ala Ala Ala Val Ser Ser Arg Pro Val Leu Thr Pro Leu Gly Thr
```

31

```
agc cgc cct gct gcc ggc gac ctg tcc gtg tac ttc cac gcg gac tcg          205
Ser Arg Pro Ala Ala Gly Asp Leu Ser Val Tyr Phe His Ala Asp Ser
          35                  40                  45

tgc ccg cag ctg gag acg atc gtg cgg tcc agc gtg gac gcg gcg ctc          253
Cys Pro Gln Leu Glu Thr Ile Val Arg Ser Ser Val Asp Ala Ala Leu
      50                  55                  60

cag cag aac gtc cgt ctg acg gcg ggt ctc ctc cgc ctc ttg ttc cac          301
Gln Gln Asn Val Arg Leu Thr Ala Gly Leu Leu Arg Leu Leu Phe His
65                  70                  75                  80

gac tgc ttc ccg cag ggc tgc gac gcg tcc atc ctc ctg gac aac ggc          349
Asp Cys Phe Pro Gln Gly Cys Asp Ala Ser Ile Leu Leu Asp Asn Gly
                  85                  90                  95

gag cgc ggc ctc ccg ccc aac gtg ggg ctg cag cag gag gcc gtg cag          397
Glu Arg Gly Leu Pro Pro Asn Val Gly Leu Gln Gln Glu Ala Val Gln
              100                 105                 110

ctg gtg gag gac atc cgc ggg aag gtg cac gcg gcg tgc ggg ccc acc          445
Leu Val Glu Asp Ile Arg Gly Lys Val His Ala Ala Cys Gly Pro Thr
              115                 120                 125

gtg tcg tgc gcc gac atc acg gtg ctg gcc acc cgc gac gcc gtg agc          493
Val Ser Cys Ala Asp Ile Thr Val Leu Ala Thr Arg Asp Ala Val Ser
          130                 135                 140

ctg tcc ggc ggg cct tcc ttc acg gtg ccg ctg ggg cgg ctg gac agc          541
Leu Ser Gly Gly Pro Ser Phe Thr Val Pro Leu Gly Arg Leu Asp Ser
145                 150                 155                 160

gcg gcg ccg gcg tcc agc aac gac gtg ttc acg ctg ccg ccg ccg acg          589
Ala Ala Pro Ala Ser Ser Asn Asp Val Phe Thr Leu Pro Pro Pro Thr
                  165                 170                 175

gcg acg gtg gac gag ctg ctg acg gcg ttc ggg agc aag aac ctg tcg          637
Ala Thr Val Asp Glu Leu Leu Thr Ala Phe Gly Ser Lys Asn Leu Ser
              180                 185                 190

gac ccg gcg gac ctg gtg gcg ctg tcg ggc gcg cac acg gtg ggg aag          685
Asp Pro Ala Asp Leu Val Ala Leu Ser Gly Ala His Thr Val Gly Lys
              195                 200                 205

gcg cgg tgc agc tcg ttt ggc gac gtg gcg ggc ccg gcc acc gac gac          733
Ala Arg Cys Ser Ser Phe Gly Asp Val Ala Gly Pro Ala Thr Asp Asp
          210                 215                 220

gtg acg cgg tgc gtg acg gcg acg tgc tcg gcc ccc ggg agc ggc gac          781
Val Thr Arg Cys Val Thr Ala Thr Cys Ser Ala Pro Gly Ser Gly Asp
225                 230                 235                 240

acg ctg cgg gac ctg gac ttc ctg acg ccc gcc gtg ttc gac aac ctc          829
Thr Leu Arg Asp Leu Asp Phe Leu Thr Pro Ala Val Phe Asp Asn Leu
              245                 250                 255
```

```
tac ttc gtg gag ctg acg ctg agg aag aac aag ggg gtg atg ctg ccg        877
Tyr Phe Val Glu Leu Thr Leu Arg Lys Asn Lys Gly Val Met Leu Pro
            260             265             270

tcg gac cag ggg ctg gtg agc gac ccg cgc acg agc tgg ctc gtc cag        925
Ser Asp Gln Gly Leu Val Ser Asp Pro Arg Thr Ser Trp Leu Val Gln
            275             280             285

ggc ttc gcc gac aac cac tgg tgg ttc ttc gac cag ttc agg acc tcc        973
Gly Phe Ala Asp Asn His Trp Trp Phe Phe Asp Gln Phe Arg Thr Ser
            290             295             300

atg atc aag atg agc cag ctc agg gga ccc cag ggg aac gtc ggc gag       1021
Met Ile Lys Met Ser Gln Leu Arg Gly Pro Gln Gly Asn Val Gly Glu
305             310             315             320

atc cgc cgt aac tgc ttc cgc cca aac acc aac ggc atc gcc gcc tct       1069
Ile Arg Arg Asn Cys Phe Arg Pro Asn Thr Asn Gly Ile Ala Ala Ser
                325             330             335

gct tga gttgactgac caggcaccga tccattactt cactttcact gtgtgtaata       1125
Ala  *


attaataata ataaaacaaa aacaacgcca gcccgtacgt gccgtgtgag gggggcacgt     1185
ggttgtggct atactgtagc cgtcaccacc atgtcggcgt cgtccatgca tgtcgcatta     1245
ccgatttttg ttcatgttcc gatctcatct catcatctcg ctatcaataa caattataat     1305
agtgtttatt agtaaaaaaa aaaaaaaaa                                       1334


<210> 25
<211> 337
<212> PRT
<213> Zea mays


<400> 25
Met Ser Gly Arg Val Phe Val Leu Ala Ala Ala Phe Gly Val Leu Leu
1               5               10              15
Ala Ala Ala Ala Val Ser Ser Arg Pro Val Leu Thr Pro Leu Gly Thr
            20              25              30
Ser Arg Pro Ala Ala Gly Asp Leu Ser Val Tyr Phe His Ala Asp Ser
            35              40              45
Cys Pro Gln Leu Glu Thr Ile Val Arg Ser Ser Val Asp Ala Ala Leu
    50              55              60
Gln Gln Asn Val Arg Leu Thr Ala Gly Leu Leu Arg Leu Leu Phe His
65              70              75              80
Asp Cys Phe Pro Gln Gly Cys Asp Ala Ser Ile Leu Leu Asp Asn Gly
                85              90              95
Glu Arg Gly Leu Pro Pro Asn Val Gly Leu Gln Gln Glu Ala Val Gln
            100             105             110
Leu Val Glu Asp Ile Arg Gly Lys Val His Ala Ala Cys Gly Pro Thr
            115             120             125
Val Ser Cys Ala Asp Ile Thr Val Leu Ala Thr Arg Asp Ala Val Ser
    130             135             140
Leu Ser Gly Gly Pro Ser Phe Thr Val Pro Leu Gly Arg Leu Asp Ser
145             150             155             160
Ala Ala Pro Ala Ser Ser Asn Asp Val Phe Thr Leu Pro Pro Pro Thr
```
33

```
                      165                      170                      175
Ala Thr Val Asp Glu Leu Leu Thr Ala Phe Gly Ser Lys Asn Leu Ser
              180                      185                      190
Asp Pro Ala Asp Leu Val Ala Leu Ser Gly Ala His Thr Val Gly Lys
          195                      200                      205
Ala Arg Cys Ser Ser Phe Gly Asp Val Ala Gly Pro Ala Thr Asp Asp
      210                      215                      220
Val Thr Arg Cys Val Thr Ala Thr Cys Ser Ala Pro Gly Ser Gly Asp
  225                      230                      235                      240
Thr Leu Arg Asp Leu Asp Phe Leu Thr Pro Ala Val Phe Asp Asn Leu
                  245                      250                      255
Tyr Phe Val Glu Leu Thr Leu Arg Lys Asn Lys Gly Val Met Leu Pro
              260                      265                      270
Ser Asp Gln Gly Leu Val Ser Asp Pro Arg Thr Ser Trp Leu Val Gln
          275                      280                      285
Gly Phe Ala Asp Asn His Trp Trp Phe Phe Asp Gln Phe Arg Thr Ser
      290                      295                      300
Met Ile Lys Met Ser Gln Leu Arg Gly Pro Gln Gly Asn Val Gly Glu
  305                      310                      315                      320
Ile Arg Arg Asn Cys Phe Arg Pro Asn Thr Asn Gly Ile Ala Ala Ser
                  325                      330                      335
Ala


<210> 26
<211> 1285
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (96)...(1058)

<400> 26
gctcgatcgg cgatctgtag tagcagcact agcactagct acgtagtaca ttgcatcgtc      60
gtctctttgc tagtagtagc tatctcctgg ccgcc atg gcg tct tcc tcg gtc      113
                                        Met Ala Ser Ser Ser Val
                                          1               5


tca tcc tgc ctg ctg ctt ctc ctg tgc ttg gcg gcg gtg gcg tcc gcg      161
Ser Ser Cys Leu Leu Leu Leu Leu Cys Leu Ala Ala Val Ala Ser Ala
            10                      15                      20


cag ctc tcg ccg acg ttc tac gac tcg tcg tgc ccc aac gcg ctg tcc      209
Gln Leu Ser Pro Thr Phe Tyr Asp Ser Ser Cys Pro Asn Ala Leu Ser
        25                      30                      35


acc atc aag agc gcc gtg aac gcc gcc gtg cag aag gag aac cgc atg      257
Thr Ile Lys Ser Ala Val Asn Ala Ala Val Gln Lys Glu Asn Arg Met
    40                      45                      50


ggg gcc tcc ttg ctc agg ctg cac ttc cat gac tgc ttt gtc cag ggg      305
Gly Ala Ser Leu Leu Arg Leu His Phe His Asp Cys Phe Val Gln Gly
  55                      60                      65                      70


tgc gac gcg tcg gtg ctg ctt gcc gac aac gcc gcc acg ggc ttc acc      353
```

34

```
Cys Asp Ala Ser Val Leu Leu Ala Asp Asn Ala Ala Thr Gly Phe Thr
                75                  80              85

ggc gag cag ggt gct gcg ccc aac gcc ggg tcg ctg agg ggc ttc gac    401
Gly Glu Gln Gly Ala Ala Pro Asn Ala Gly Ser Leu Arg Gly Phe Asp
            90              95              100

gtc atc gcc aac atc aag gca cag gtg gag gca gtc tgc aag cag acc    449
Val Ile Ala Asn Ile Lys Ala Gln Val Glu Ala Val Cys Lys Gln Thr
        105             110             115

gtc tcc tgc gcc gac atc ctc gcc gtc gcc gcc cgt gat tcc gtc gtc    497
Val Ser Cys Ala Asp Ile Leu Ala Val Ala Ala Arg Asp Ser Val Val
    120             125             130

gcg ttg ggc ggg ccg tca tgg acg gtt cct ctg ggg cgg agg gac tcg    545
Ala Leu Gly Gly Pro Ser Trp Thr Val Pro Leu Gly Arg Arg Asp Ser
135             140             145             150

acg acg gcg agc ctg tcc ctg gcg aac agc gac ctg ccg cct ccc ttc    593
Thr Thr Ala Ser Leu Ser Leu Ala Asn Ser Asp Leu Pro Pro Pro Phe
                155             160             165

ttc aac ctc ggc cag ctc ata aca gcg ttc ggc aac aag ggt ttc acc    641
Phe Asn Leu Gly Gln Leu Ile Thr Ala Phe Gly Asn Lys Gly Phe Thr
                170             175             180

gcg acc gag atg gcc acg ctc tcc ggc gcg cac acc atc ggg cag gcg    689
Ala Thr Glu Met Ala Thr Leu Ser Gly Ala His Thr Ile Gly Gln Ala
        185             190             195

cag tgc aag aac ttc agg gac cac atc tac aac gac acc aac atc aac    737
Gln Cys Lys Asn Phe Arg Asp His Ile Tyr Asn Asp Thr Asn Ile Asn
    200             205             210

cag ggc ttc gcg agc tcg ctc aag gcc aac tgc ccc cgg ccc acc ggc    785
Gln Gly Phe Ala Ser Ser Leu Lys Ala Asn Cys Pro Arg Pro Thr Gly
215             220             225             230

tcc ggc gac ggc aac ctg gcg ccg ctc gac acc acc acg ccg tac agc    833
Ser Gly Asp Gly Asn Leu Ala Pro Leu Asp Thr Thr Thr Pro Tyr Ser
                235             240             245

ttc gac aac gcc tac tac agc aac ctg ctg agc cag aag ggg ctc ctg    881
Phe Asp Asn Ala Tyr Tyr Ser Asn Leu Leu Ser Gln Lys Gly Leu Leu
                250             255             260

cac tcg gac cag gag ctc ttc aac ggc ggc agc acc gac aac acc gtc    929
His Ser Asp Gln Glu Leu Phe Asn Gly Gly Ser Thr Asp Asn Thr Val
            265             270             275

agg aac ttc gcg tcc aac tcg gcc gcc ttc agc agc gcc ttc gcc gcg    977
Arg Asn Phe Ala Ser Asn Ser Ala Ala Phe Ser Ser Ala Phe Ala Ala
    280             285             290

gcc atg gtg aag atg ggc aac ctc agc ccg ctc acc gga tct cag ggc    1025
Ala Met Val Lys Met Gly Asn Leu Ser Pro Leu Thr Gly Ser Gln Gly
```

35

```
cag atc agg ctt acc tgc tcc aca gtg aac taa gattaataat aatcaccata    1078
Gln Ile Arg Leu Thr Cys Ser Thr Val Asn  *
                    315                320


cgcaaaaaag agtggtatat tcacatgcga ataataaggc taagccacca tgtgactagc    1138
tagtggtata ttcaacgaat cgtttgaaag ggacgagtgc gactttaatt ttagatacta    1198
gctgcaaaag cggcatatat gtatcagccc gatcaattgc tcaaagaaaa gatgcacgtc    1258
atacatttca aaaaaaaaa aaaaaaa                                         1285
```

<210> 27
<211> 320
<212> PRT
<213> Zea mays

<400> 27

```
Met Ala Ser Ser Ser Val Ser Ser Cys Leu Leu Leu Leu Leu Cys Leu
1               5                   10                  15
Ala Ala Val Ala Ser Ala Gln Leu Ser Pro Thr Phe Tyr Asp Ser Ser
            20                  25                  30
Cys Pro Asn Ala Leu Ser Thr Ile Lys Ser Ala Val Asn Ala Ala Val
        35                  40                  45
Gln Lys Glu Asn Arg Met Gly Ala Ser Leu Leu Arg Leu His Phe His
    50                  55                  60
Asp Cys Phe Val Gln Gly Cys Asp Ala Ser Val Leu Leu Ala Asp Asn
65                  70                  75                  80
Ala Ala Thr Gly Phe Thr Gly Glu Gln Gly Ala Ala Pro Asn Ala Gly
            85                  90                  95
Ser Leu Arg Gly Phe Asp Val Ile Ala Asn Ile Lys Ala Gln Val Glu
            100                 105                 110
Ala Val Cys Lys Gln Thr Val Ser Cys Ala Asp Ile Leu Ala Val Ala
        115                 120                 125
Ala Arg Asp Ser Val Val Ala Leu Gly Gly Pro Ser Trp Thr Val Pro
    130                 135                 140
Leu Gly Arg Arg Asp Ser Thr Thr Ala Ser Leu Ser Leu Ala Asn Ser
145                 150                 155                 160
Asp Leu Pro Pro Pro Phe Phe Asn Leu Gly Gln Leu Ile Thr Ala Phe
                165                 170                 175
Gly Asn Lys Gly Phe Thr Ala Thr Glu Met Ala Thr Leu Ser Gly Ala
            180                 185                 190
His Thr Ile Gly Gln Ala Gln Cys Lys Asn Phe Arg Asp His Ile Tyr
    195                 200                 205
Asn Asp Thr Asn Ile Asn Gln Gly Phe Ala Ser Ser Leu Lys Ala Asn
    210                 215                 220
Cys Pro Arg Pro Thr Gly Ser Gly Asp Gly Asn Leu Ala Pro Leu Asp
225                 230                 235                 240
Thr Thr Thr Pro Tyr Ser Phe Asp Asn Ala Tyr Tyr Ser Asn Leu Leu
                245                 250                 255
Ser Gln Lys Gly Leu Leu His Ser Asp Gln Glu Leu Phe Asn Gly Gly
            260                 265                 270
Ser Thr Asp Asn Thr Val Arg Asn Phe Ala Ser Asn Ser Ala Ala Phe
    275                 280                 285
Ser Ser Ala Phe Ala Ala Ala Met Val Lys Met Gly Asn Leu Ser Pro
    290                 295                 300
Leu Thr Gly Ser Gln Gly Gln Ile Arg Leu Thr Cys Ser Thr Val Asn
```

36

<210> 28
<211> 1159
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (7)...(969)

<400> 28
gtggcg atg gca gta ctg cac ttg cag gcg gcg gcg gtg gcg gtg ctg   48
      Met Ala Val Leu His Leu Gln Ala Ala Ala Val Ala Val Leu
       1   5   10

ctg atg gcg acg ggg ctg cgc gcg cag ctg cgt gtg ggc ttc tac gac   96
Leu Met Ala Thr Gly Leu Arg Ala Gln Leu Arg Val Gly Phe Tyr Asp
 15   20   25   30

agc tcg tgc cca gcg gcg gag atc atc gtg cag cag gag gtg agc agg   144
Ser Ser Cys Pro Ala Ala Glu Ile Ile Val Gln Gln Glu Val Ser Arg
          35   40   45

gcg gtg gcg gcc aac ccg ggc ctc gcc gcc ggc ctg ctc cgc ctc cac   192
Ala Val Ala Ala Asn Pro Gly Leu Ala Ala Gly Leu Leu Arg Leu His
         50   55   60

ttc cac gac tgt ttc gtt ggg ggc tgc gac gcg tcc gtg ctc atc gac   240
Phe His Asp Cys Phe Val Gly Gly Cys Asp Ala Ser Val Leu Ile Asp
         65   70   75

tcc acc aag ggc aac acc gcg gag aag gac gcc ggg ccc aac ctc agc   288
Ser Thr Lys Gly Asn Thr Ala Glu Lys Asp Ala Gly Pro Asn Leu Ser
     80   85   90

ctg cgg ggc ttc gag gtc gtc gat cgc atc aag gcg cgc gtc gag cag   336
Leu Arg Gly Phe Glu Val Val Asp Arg Ile Lys Ala Arg Val Glu Gln
 95   100   105   110

gcc tgc ttc ggc gtc gtc tcc tgc gcg gac ata ctc gcg ttc gcg gcc   384
Ala Cys Phe Gly Val Val Ser Cys Ala Asp Ile Leu Ala Phe Ala Ala
           115   120   125

agg gac agc gtc gca ctc gcc ggc ggg aac gcg tac cag gtg ccg gcg   432
Arg Asp Ser Val Ala Leu Ala Gly Gly Asn Ala Tyr Gln Val Pro Ala
          130   135   140

ggg cgg cgg gac ggg tcc gtg tcg cgc gcg tcg gac acc aac ggc aac   480
Gly Arg Arg Asp Gly Ser Val Ser Arg Ala Ser Asp Thr Asn Gly Asn
         145   150   155

ctg ccg ccg ccg acg gcc aac gtc gcg cag ctc acg cag atc ttc ggc   528
Leu Pro Pro Pro Thr Ala Asn Val Ala Gln Leu Thr Gln Ile Phe Gly
 160   165   170

37

```
acc aag ggc ctg acg cag aag gag atg gtc atc ctg tcg ggc gcg cac        576
Thr Lys Gly Leu Thr Gln Lys Glu Met Val Ile Leu Ser Gly Ala His
175             180             185             190

acc atc ggc tcc tcg cac tgc agc tcc ttc agc ggc cgg ctg tcg ggg        624
Thr Ile Gly Ser Ser His Cys Ser Ser Phe Ser Gly Arg Leu Ser Gly
                195             200             205

tcg gcc acg acg gcg ggc ggg cag gac ccg acc atg gac ccg gcg tac        672
Ser Ala Thr Thr Ala Gly Gly Gln Asp Pro Thr Met Asp Pro Ala Tyr
            210             215             220

gtg gcg cag ctg gcg cgg cag tgc ccg cag ggc ggc gac ccg ctc gtg        720
Val Ala Gln Leu Ala Arg Gln Cys Pro Gln Gly Gly Asp Pro Leu Val
        225             230             235

ccc atg gac tac gtc tcc ccc aac gcc ttc gac gag ggc ttc tac aag        768
Pro Met Asp Tyr Val Ser Pro Asn Ala Phe Asp Glu Gly Phe Tyr Lys
    240             245             250

ggc gtc atg tcc aac cgc ggc ctg ctg tcc tcg gac cag gcg ctg ctc        816
Gly Val Met Ser Asn Arg Gly Leu Leu Ser Ser Asp Gln Ala Leu Leu
255             260             265             270

agc gac aag aac acc gcc gtg cag gtc gtc acc tac gcc aac gac ccg        864
Ser Asp Lys Asn Thr Ala Val Gln Val Val Thr Tyr Ala Asn Asp Pro
            275             280             285

gcc acc ttc cag gcc gac ttc gcc gcc gcc atg gtc aag atg ggc tcc        912
Ala Thr Phe Gln Ala Asp Phe Ala Ala Ala Met Val Lys Met Gly Ser
            290             295             300

gtc ggc gtg ctc acc ggc acc agc ggc aag gtc agg gcc aac tgc aga        960
Val Gly Val Leu Thr Gly Thr Ser Gly Lys Val Arg Ala Asn Cys Arg
        305             310             315

gtc gcc tga tccatcatca tcattcactc gtgtggagtt gtagattcgt              1009
Val Ala  *
        320

tatattgatt gatttggacc ggacgacgtc gacgggatgg cgtagcatag catagtctgc    1069
ttgcgcaatt gtatgtattg cctgtacttg cgcgtgtatg ggtttcgctg tgcaaatttt    1129
cgttggctcc ccaaaaaaaa aaaaaaaaaa                                      1159

<210> 29
<211> 320
<212> PRT
<213> Zea mays

<400> 29
Met Ala Val Leu His Leu Gln Ala Ala Ala Val Ala Val Leu Leu Met
 1               5               10              15
Ala Thr Gly Leu Arg Ala Gln Leu Arg Val Gly Phe Tyr Asp Ser Ser
            20              25              30
Cys Pro Ala Ala Glu Ile Ile Val Gln Gln Glu Val Ser Arg Ala Val
        35              40              45
Ala Ala Asn Pro Gly Leu Ala Ala Gly Leu Leu Arg Leu His Phe His
```

38

```
          50                          55                          60
Asp Cys Phe Val Gly Gly Cys Asp Ala Ser Val Leu Ile Asp Ser Thr
65                          70                          75                          80
Lys Gly Asn Thr Ala Glu Lys Asp Ala Gly Pro Asn Leu Ser Leu Arg
                        85                          90                          95
Gly Phe Glu Val Val Asp Arg Ile Lys Ala Arg Val Glu Gln Ala Cys
                    100                         105                         110
Phe Gly Val Val Ser Cys Ala Asp Ile Leu Ala Phe Ala Ala Arg Asp
                115                         120                         125
Ser Val Ala Leu Ala Gly Gly Asn Ala Tyr Gln Val Pro Ala Gly Arg
            130                         135                         140
Arg Asp Gly Ser Val Ser Arg Ala Ser Asp Thr Asn Gly Asn Leu Pro
145                         150                         155                         160
Pro Pro Thr Ala Asn Val Ala Gln Leu Thr Gln Ile Phe Gly Thr Lys
                    165                         170                         175
Gly Leu Thr Gln Lys Glu Met Val Ile Leu Ser Gly Ala His Thr Ile
                180                         185                         190
Gly Ser Ser His Cys Ser Ser Phe Ser Gly Arg Leu Ser Gly Ser Ala
            195                         200                         205
Thr Thr Ala Gly Gly Gln Asp Pro Thr Met Asp Pro Ala Tyr Val Ala
        210                         215                         220
Gln Leu Ala Arg Gln Cys Pro Gln Gly Gly Asp Pro Leu Val Pro Met
225                         230                         235                         240
Asp Tyr Val Ser Pro Asn Ala Phe Asp Glu Gly Phe Tyr Lys Gly Val
                    245                         250                         255
Met Ser Asn Arg Gly Leu Leu Ser Ser Asp Gln Ala Leu Leu Ser Asp
                260                         265                         270
Lys Asn Thr Ala Val Gln Val Val Thr Tyr Ala Asn Asp Pro Ala Thr
            275                         280                         285
Phe Gln Ala Asp Phe Ala Ala Ala Met Val Lys Met Gly Ser Val Gly
        290                         295                         300
Val Leu Thr Gly Thr Ser Gly Lys Val Arg Ala Asn Cys Arg Val Ala
305                         310                         315                         320
```

```
<210> 30
<211> 1310
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (100)...(1098)

<400> 30
cgcacgctag tgtcagtggc acgcagggca gccgcgcgca ccgaggggag gccagagcta    60
gcggcgaggc caagggcgcg ggcgcgggcg cggacggca atg gcg aga gct gga       114
                                            Met Ala Arg Ala Gly
                                            1                   5


ggc ggc ggt ccg gtc cgc ggc gcg gcg ctg gtg gtc gtg ctg cta ggc   162
Gly Gly Gly Pro Val Arg Gly Ala Ala Leu Val Val Val Leu Leu Gly
                10                      15                      20


atc gtc gtg ggc gcg gcg agg gct cag ctg cgg cag aac tac tac ggc   210
Ile Val Val Gly Ala Ala Arg Ala Gln Leu Arg Gln Asn Tyr Tyr Gly
                25                      30                      35
```

39

```
agc tcg tgc ccc agc gcg gag tcc acg gtg cgc tcc gtc atc tcg cag        258
Ser Ser Cys Pro Ser Ala Glu Ser Thr Val Arg Ser Val Ile Ser Gln
        40                  45                  50

cgc ctc cag cag agc ttc gcc gtg ggg ccc ggc acg ctc cgc ctc ttc        306
Arg Leu Gln Gln Ser Phe Ala Val Gly Pro Gly Thr Leu Arg Leu Phe
        55                  60                  65

ttc cac gac tgc ttc gtc agg gga tgc gac gcg tcg gtg atg ctg atg        354
Phe His Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Met Leu Met
70                  75                  80                  85

gcg ccg aac ggg gac gac gag agc cac agc ggc gcg gac gcc acg ctg        402
Ala Pro Asn Gly Asp Asp Glu Ser His Ser Gly Ala Asp Ala Thr Leu
                90                  95                  100

tcg ccg gac gcc gtg gac gcc atc aac aag gcg aag gcg gcc gtg gag        450
Ser Pro Asp Ala Val Asp Ala Ile Asn Lys Ala Lys Ala Ala Val Glu
                105                 110                 115

gcg ctc ccc ggg tgc gcc ggc aag gtc tcg tgc gcg gac atc ctc gcc        498
Ala Leu Pro Gly Cys Ala Gly Lys Val Ser Cys Ala Asp Ile Leu Ala
                120                 125                 130

atg gcc gca cgt gac gtc gtc tcc ctg ctg ggc ggt ccg agc tac ggc        546
Met Ala Ala Arg Asp Val Val Ser Leu Leu Gly Gly Pro Ser Tyr Gly
        135                 140                 145

gtg gag ctg ggg cgg ctg gac ggc aag acg ttc aac agg gcc atc gtg        594
Val Glu Leu Gly Arg Leu Asp Gly Lys Thr Phe Asn Arg Ala Ile Val
150                 155                 160                 165

aag cac gtc ctc ccg ggc ccc ggc ttc aac ctg gac cag ctc aac gcc        642
Lys His Val Leu Pro Gly Pro Gly Phe Asn Leu Asp Gln Leu Asn Ala
                170                 175                 180

ctc ttc gcg cag aac ggc ctc acg cag acg gac atg atc gcg ctc tca        690
Leu Phe Ala Gln Asn Gly Leu Thr Gln Thr Asp Met Ile Ala Leu Ser
                185                 190                 195

ggc gcg cac acg atc ggg gtg acg cac tgc gac aag ttc gtg cgg cgg        738
Gly Ala His Thr Ile Gly Val Thr His Cys Asp Lys Phe Val Arg Arg
                200                 205                 210

atc tac acg ttc aag cag cgg ctg gcg tgg aac ccg ccg atg aac ctg        786
Ile Tyr Thr Phe Lys Gln Arg Leu Ala Trp Asn Pro Pro Met Asn Leu
        215                 220                 225

gac ttc ctg cgc tcg ctg cgg cgg gtg tgc ccc ctc agc tac agc ccc        834
Asp Phe Leu Arg Ser Leu Arg Arg Val Cys Pro Leu Ser Tyr Ser Pro
230                 235                 240                 245

acg gcg ttc gcc atg ctg gac gtc acc acg ccc agg gtc ttc gac aac        882
Thr Ala Phe Ala Met Leu Asp Val Thr Thr Pro Arg Val Phe Asp Asn
        250                 255                 260
```

40

```
gcc tac ttc aac aac ctc cgc tac aac aag ggc ctg ctc gcc tcc gac        930
Ala Tyr Phe Asn Asn Leu Arg Tyr Asn Lys Gly Leu Leu Ala Ser Asp
            265                 270                 275

cag gtg ctc ttc acc gac cgc cgc tcc cga ccc acc gtc aac ctc ttc        978
Gln Val Leu Phe Thr Asp Arg Arg Ser Arg Pro Thr Val Asn Leu Phe
            280                 285                 290

gcc gcc aac gcc acc gcc ttc tac gag gca ttc gtc gcc gcc atg gcc       1026
Ala Ala Asn Ala Thr Ala Phe Tyr Glu Ala Phe Val Ala Ala Met Ala
            295                 300                 305

aag ctc ggc agg atc ggc ctc aag acc ggc gcc gac ggc gag ata cgc       1074
Lys Leu Gly Arg Ile Gly Leu Lys Thr Gly Ala Asp Gly Glu Ile Arg
310                 315                 320                 325

cgc gtc tgc acc gcc gtc aac taa gcctgcattg ctgcttgct gcttgcgtgc       1128
Arg Val Cys Thr Ala Val Asn  *
                330

gtgggtttca cttatttcac ttcttctttc tcttgtttat atacgtacgt ttgtcggatg     1188
gattttggta gccatgagat gacatccttg ctctgagcta gcggacctgc cccgattgga     1248
tgatatagat tgatccagat gttcttctaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa     1308
aa                                                                     1310

<210> 31
<211> 332
<212> PRT
<213> Zea mays

<400> 31
Met Ala Arg Ala Gly Gly Gly Gly Pro Val Arg Gly Ala Ala Leu Val
1               5                   10                  15
Val Val Leu Leu Gly Ile Val Val Gly Ala Ala Arg Ala Gln Leu Arg
            20                  25                  30
Gln Asn Tyr Tyr Gly Ser Ser Cys Pro Ser Ala Glu Ser Thr Val Arg
        35                  40                  45
Ser Val Ile Ser Gln Arg Leu Gln Gln Ser Phe Ala Val Gly Pro Gly
    50                  55                  60
Thr Leu Arg Leu Phe Phe His Asp Cys Phe Val Arg Gly Cys Asp Ala
65                  70                  75                  80
Ser Val Met Leu Met Ala Pro Asn Gly Asp Asp Glu Ser His Ser Gly
            85                  90                  95
Ala Asp Ala Thr Leu Ser Pro Asp Ala Val Asp Ala Ile Asn Lys Ala
            100                 105                 110
Lys Ala Ala Val Glu Ala Leu Pro Gly Cys Ala Gly Lys Val Ser Cys
        115                 120                 125
Ala Asp Ile Leu Ala Met Ala Ala Arg Asp Val Val Ser Leu Leu Gly
        130                 135                 140
Gly Pro Ser Tyr Gly Val Glu Leu Gly Arg Leu Asp Gly Lys Thr Phe
145                 150                 155                 160
Asn Arg Ala Ile Val Lys His Val Leu Pro Gly Pro Gly Phe Asn Leu
                165                 170                 175
Asp Gln Leu Asn Ala Leu Phe Ala Gln Asn Gly Leu Thr Gln Thr Asp
            180                 185                 190
Met Ile Ala Leu Ser Gly Ala His Thr Ile Gly Val Thr His Cys Asp
            195                 200                 205
```

41

```
Lys Phe Val Arg Arg Ile Tyr Thr Phe Lys Gln Arg Leu Ala Trp Asn
    210                 215             220
Pro Pro Met Asn Leu Asp Phe Leu Arg Ser Leu Arg Arg Val Cys Pro
225                 230             235                 240
Leu Ser Tyr Ser Pro Thr Ala Phe Ala Met Leu Asp Val Thr Thr Pro
                245             250                 255
Arg Val Phe Asp Asn Ala Tyr Phe Asn Asn Leu Arg Tyr Asn Lys Gly
            260             265             270
Leu Leu Ala Ser Asp Gln Val Leu Phe Thr Asp Arg Arg Ser Arg Pro
        275             280             285
Thr Val Asn Leu Phe Ala Ala Asn Ala Thr Ala Phe Tyr Glu Ala Phe
    290             295             300
Val Ala Ala Met Ala Lys Leu Gly Arg Ile Gly Leu Lys Thr Gly Ala
305             310             315             320
Asp Gly Glu Ile Arg Arg Val Cys Thr Ala Val Asn
            325             330


<210> 32
<211> 1170
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (25)...(1092)

<400> 32
gggcggcagc agcagcctgc gcct atg tac act gca atg gca gcg cga ccg        51
                          Met Tyr Thr Ala Met Ala Ala Arg Pro
                           1               5

ctg ctt ctt ccc cct ccg gtc ctc ctc ctc ctg gtg gtg ctg gct gct        99
Leu Leu Leu Pro Pro Pro Val Leu Leu Leu Leu Val Val Leu Ala Ala
 10              15                  20                  25

tcg tcg gcc gcc cat ggc tac ggc gcc tac ggc tac ggc gac gct gct       147
Ser Ser Ala Ala His Gly Tyr Gly Ala Tyr Gly Tyr Gly Asp Ala Ala
                30                  35                  40

gct gag ctc agg gtc ggg ttc tac aag gac tcg tgc ccg gac gcc gag       195
Ala Glu Leu Arg Val Gly Phe Tyr Lys Asp Ser Cys Pro Asp Ala Glu
                45                  50                  55

gcc gtc gtc cgc agg atc gtc gcc aag gcc gtc caa gag gac ccc acg       243
Ala Val Val Arg Arg Ile Val Ala Lys Ala Val Gln Glu Asp Pro Thr
                60                  65                  70

gcc aac gcg ccg ctg ctc agg ctc cac ttc cac gac tgc ttc gtc cgg       291
Ala Asn Ala Pro Leu Leu Arg Leu His Phe His Asp Cys Phe Val Arg
        75                  80                  85

ggc tgc gac ggc tcc gtg ctc gtc aac tcc acc agg ggg aac acg gcg       339
Gly Cys Asp Gly Ser Val Leu Val Asn Ser Thr Arg Gly Asn Thr Ala
 90              95                  100                 105

gag aag gac gcc aag ccc aac cac acg ctg gac gcc ttc gac gtc atc       387
```
42

```
Glu Lys Asp Ala Lys Pro Asn His Thr Leu Asp Ala Phe Asp Val Ile
            110             115             120

gac gac atc aag gag gcg ctg gag aag cgc tgc ccg ggg acc gtc tcc    435
Asp Asp Ile Lys Glu Ala Leu Glu Lys Arg Cys Pro Gly Thr Val Ser
            125             130             135

tgc gcc gac atc ctc gcc atc gcc gcc agg gac gcc gtc tcg ctg gcc    483
Cys Ala Asp Ile Leu Ala Ile Ala Ala Arg Asp Ala Val Ser Leu Ala
            140             145             150

acc aag gtg gtg acc aag ggc ggc tgg agc agg gac ggc aac ctc tac    531
Thr Lys Val Val Thr Lys Gly Gly Trp Ser Arg Asp Gly Asn Leu Tyr
            155             160             165

cag gtg gag acc ggc agg cgg gac ggc cgc gtg tcc aga gcc aag gag    579
Gln Val Glu Thr Gly Arg Arg Asp Gly Arg Val Ser Arg Ala Lys Glu
170             175             180             185

gcc gtc aag aac ttg ccg gac tcc atg gat ggc atc cgc aag ctc atc    627
Ala Val Lys Asn Leu Pro Asp Ser Met Asp Gly Ile Arg Lys Leu Ile
            190             195             200

agg agg ttc gct tcc aag aac ctc agc gtc aag gat ctc gct gtt ctc    675
Arg Arg Phe Ala Ser Lys Asn Leu Ser Val Lys Asp Leu Ala Val Leu
            205             210             215

tca ggc gcc cac gcg atc ggc aaa tcg cac tgc ccg tcg atc gcc aag    723
Ser Gly Ala His Ala Ile Gly Lys Ser His Cys Pro Ser Ile Ala Lys
            220             225             230

cgg ctg cgc aac ttc acg gcg cac cgg gac agc gac ccg acc ctg gac    771
Arg Leu Arg Asn Phe Thr Ala His Arg Asp Ser Asp Pro Thr Leu Asp
235             240             245

ggc gcg tac gcg gcg gag ctg agg cgg cag tgc cgg agg cgc agg gac    819
Gly Ala Tyr Ala Ala Glu Leu Arg Arg Gln Cys Arg Arg Arg Arg Asp
250             255             260             265

aac acg acg gag ctg gag atg gtg ccg ggg agc tcc acc gcg ttc ggc    867
Asn Thr Thr Glu Leu Glu Met Val Pro Gly Ser Ser Thr Ala Phe Gly
            270             275             280

acg gcc tac tac ggc ctg gtc gcg gag cgg agg gcg ctc ttc cac tcc    915
Thr Ala Tyr Tyr Gly Leu Val Ala Glu Arg Arg Ala Leu Phe His Ser
            285             290             295

gac gag gcg ctg ctc agg aac ggg gag acc agg gcg ctc gtc tac cgc    963
Asp Glu Ala Leu Leu Arg Asn Gly Glu Thr Arg Ala Leu Val Tyr Arg
            300             305             310

tat agg gac gcg ccg tcc gag gcg gcg ttc ctc gcg gaa ttc ggg gcg    1011
Tyr Arg Asp Ala Pro Ser Glu Ala Ala Phe Leu Ala Glu Phe Gly Ala
            315             320             325

tcc atg ctc aac atg ggc agg gtg ggc gtg ctc acc ggc gcc cag ggg    1059
Ser Met Leu Asn Met Gly Arg Val Gly Val Leu Thr Gly Ala Gln Gly
```

43

```
gag atc agg aag agg tgc gcc ttt gtc aac tag ctagcgatat gctggattgt   1112
Glu Ile Arg Lys Arg Cys Ala Phe Val Asn  *
                350                    355

actttgtacc ctctcgcctt aattaaaatt taaatgctgg agtttcacct aaaaaaaa     1170
```

<210> 33
<211> 355
<212> PRT
<213> Zea mays

<400> 33

```
Met Tyr Thr Ala Met Ala Ala Arg Pro Leu Leu Leu Pro Pro Pro Val
1               5                   10                  15
Leu Leu Leu Leu Val Val Leu Ala Ala Ser Ser Ala Ala His Gly Tyr
        20                  25                  30
Gly Ala Tyr Gly Tyr Gly Asp Ala Ala Ala Glu Leu Arg Val Gly Phe
        35                  40                  45
Tyr Lys Asp Ser Cys Pro Asp Ala Glu Ala Val Val Arg Arg Ile Val
    50                  55                  60
Ala Lys Ala Val Gln Glu Asp Pro Thr Ala Asn Ala Pro Leu Leu Arg
65                  70                  75                  80
Leu His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly Ser Val Leu
                85                  90                  95
Val Asn Ser Thr Arg Gly Asn Thr Ala Glu Lys Asp Ala Lys Pro Asn
            100                 105                 110
His Thr Leu Asp Ala Phe Asp Val Ile Asp Asp Ile Lys Glu Ala Leu
            115                 120                 125
Glu Lys Arg Cys Pro Gly Thr Val Ser Cys Ala Asp Ile Leu Ala Ile
            130                 135                 140
Ala Ala Arg Asp Ala Val Ser Leu Ala Thr Lys Val Val Thr Lys Gly
145                 150                 155                 160
Gly Trp Ser Arg Asp Gly Asn Leu Tyr Gln Val Glu Thr Gly Arg Arg
                165                 170                 175
Asp Gly Arg Val Ser Arg Ala Lys Glu Ala Val Lys Asn Leu Pro Asp
            180                 185                 190
Ser Met Asp Gly Ile Arg Lys Leu Ile Arg Arg Phe Ala Ser Lys Asn
            195                 200                 205
Leu Ser Val Lys Asp Leu Ala Val Leu Ser Gly Ala His Ala Ile Gly
            210                 215                 220
Lys Ser His Cys Pro Ser Ile Ala Lys Arg Leu Arg Asn Phe Thr Ala
225                 230                 235                 240
His Arg Asp Ser Asp Pro Thr Leu Asp Gly Ala Tyr Ala Ala Glu Leu
                245                 250                 255
Arg Arg Gln Cys Arg Arg Arg Arg Asp Asn Thr Thr Glu Leu Glu Met
            260                 265                 270
Val Pro Gly Ser Ser Thr Ala Phe Gly Thr Ala Tyr Tyr Gly Leu Val
            275                 280                 285
Ala Glu Arg Arg Ala Leu Phe His Ser Asp Glu Ala Leu Leu Arg Asn
            290                 295                 300
Gly Glu Thr Arg Ala Leu Val Tyr Arg Tyr Arg Asp Ala Pro Ser Glu
305                 310                 315                 320
Ala Ala Phe Leu Ala Glu Phe Gly Ala Ser Met Leu Asn Met Gly Arg
                325                 330                 335
Val Gly Val Leu Thr Gly Ala Gln Gly Glu Ile Arg Lys Arg Cys Ala
```

44

```
              340                    345                    350
Phe Val Asn
              355


<210> 34
<211> 1391
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (103)...(1089)

<400> 34
ggacgagact cgcagctagc tgacacggcc gagaagcagc ttgcattgca ggcgtagtac      60
gtacccagca gcagctagca ctagcagtcc atcggagcga cg atg gtg aga agg        114
                                              Met Val Arg Arg
                                               1


acg gtg ctg gcg gcg ctg ctg gtg gcc gcc gcc ctc gcc ggc ggc gcg      162
Thr Val Leu Ala Ala Leu Leu Val Ala Ala Ala Leu Ala Gly Gly Ala
 5                  10                  15                  20


cgg gcg cag ctc aag gag ggg ttc tac gac tac tcc tgc cca cag gcg      210
Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser Cys Pro Gln Ala
                25                  30                  35


gag aag atc gtc aag gac tac gtg aag gcg cac atc ccc cac gcg ccc      258
Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile Pro His Ala Pro
                    40                  45                  50


gac gtc gcc tcc acc ctg ctc cgc acc cac ttc cac gac tgc ttc gtc      306
Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His Asp Cys Phe Val
                55                  60                  65


agg ggc tgc gac gcg tca gtg ctg ctc aac gcg acg ggc ggc agc gag      354
Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr Gly Gly Ser Glu
        70                  75                  80


gcg gag aag gac gcg gcg ccc aac ctg acg ctg cgc ggc ttc ggc ttc      402
Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg Gly Phe Gly Phe
 85                  90                  95                 100


atc gac cgc atc aag gcg ctg ctc gag aag gag tgc ccc ggc gtg gtg      450
Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys Pro Gly Val Val
                105                 110                 115


tcc tgc gcc gac atc gtc gcg ctc gcc gcc cgc gac tcc gtc ggc gtc      498
Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp Ser Val Gly Val
                120                 125                 130


atc ggc ggt ccg ttc tgg agc gtg ccg acg ggg agg cgc gac ggc acc      546
Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg Arg Asp Gly Thr
            135                 140                 145


gtg tcc atc aag cag gag gcg ctg gac cag atc ccc gcg ccc acc atg      594
```

45

```
Val Ser Ile Lys Gln Glu Ala Leu Asp Gln Ile Pro Ala Pro Thr Met
150             155             160

aac ttc acc caa ctc ctc cag tcc ttc cag aac aag agc ctc aac ctc      642
Asn Phe Thr Gln Leu Leu Gln Ser Phe Gln Asn Lys Ser Leu Asn Leu
165             170             175             180

gcc gac ctc gtc tgg ctc tca ggg gct cac acg atc ggc atc tcc caa      690
Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile Gly Ile Ser Gln
                185             190             195

tgc aac tcc ttc agc gag cgc ctg tac aac ttc acg ggg cgc ggc ggg      738
Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr Gly Arg Gly Gly
                200             205             210

ccc gac gac gcg gac ccg tcg ctg gac ccg ctg tac gcc gcg aag ttg      786
Pro Asp Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr Ala Ala Lys Leu
            215             220             225

cgg ctc aag tgc aag acg ctg acg gac aac acg acg atc gtg gag atg      834
Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr Ile Val Glu Met
230             235             240

gac ccc ggc agc ttc cgc acc ttc gac ctg agc tac tac cgc ggc gtg      882
Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr Tyr Arg Gly Val
245             250             255             260

ctc aag cgg cgg ggc ctg ttc cag tcc gac gcc gcg ctc atc acc gac      930
Leu Lys Arg Arg Gly Leu Phe Gln Ser Asp Ala Ala Leu Ile Thr Asp
                265             270             275

gcc gcc tcc aag gcc gac atc ctc agc gtg atc aac gcg ccg ccc gag      978
Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn Ala Pro Pro Glu
            280             285             290

gtg ttc ttc cag gtc ttc gcg ggc tcc atg gtc aag atg ggc gcc atc     1026
Val Phe Phe Gln Val Phe Ala Gly Ser Met Val Lys Met Gly Ala Ile
            295             300             305

gag gtc aag acc ggc tcc gag ggc gag atc agg aag cac tgc gcc ctc     1074
Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys His Cys Ala Leu
310             315             320

gtc aac aag cac tag gcggcggaat tcatgcggga gatggctcca ttgctcgcaa     1129
Val Asn Lys His  *
325


aaaaatcctt gtgagacaca caacatgctc tgcatctgca ggcgttgtcg tcaccttggt     1189
ggacgtagta catcggtgca tggattatct gttgtttaat ttgtacgttc agttcattct     1249
gtttcttgta ttcttttggt tcctttcctc ttgtttattc atggatgatg aggtgtttct     1309
gttttattct ctggttcagc tgtaaccatg taacatgtaa ggtgcgcgtt ttgtcctaaa     1369
aaaaaaaaaa aaaaaaaaaa aa                                             1391
```

<210> 35
<211> 328
<212> PRT
<213> Zea mays

46

<400> 35

```
Met Val Arg Arg Thr Val Leu Ala Ala Leu Leu Val Ala Ala Ala Leu
 1               5                  10                  15
Ala Gly Gly Ala Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser
            20                  25                  30
Cys Pro Gln Ala Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile
        35                  40                  45
Pro His Ala Pro Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His
    50                  55                  60
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr
65                  70                  75                  80
Gly Gly Ser Glu Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg
                85                  90                  95
Gly Phe Gly Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys
            100                 105                 110
Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp
        115                 120                 125
Ser Val Gly Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg
130                 135                 140
Arg Asp Gly Thr Val Ser Ile Lys Gln Glu Ala Leu Asp Gln Ile Pro
145                 150                 155                 160
Ala Pro Thr Met Asn Phe Thr Gln Leu Leu Gln Ser Phe Gln Asn Lys
                165                 170                 175
Ser Leu Asn Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile
                180                 185                 190
Gly Ile Ser Gln Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr
            195                 200                 205
Gly Arg Gly Gly Pro Asp Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr
    210                 215                 220
Ala Ala Lys Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr
225                 230                 235                 240
Ile Val Glu Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr
                245                 250                 255
Tyr Arg Gly Val Leu Lys Arg Arg Gly Leu Phe Gln Ser Asp Ala Ala
            260                 265                 270
Leu Ile Thr Asp Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn
        275                 280                 285
Ala Pro Pro Glu Val Phe Phe Gln Val Phe Ala Gly Ser Met Val Lys
    290                 295                 300
Met Gly Ala Ile Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys
305                 310                 315                 320
His Cys Ala Leu Val Asn Lys His
            325
```

<210> 36
<211> 1476
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (259)...(1236)

<400> 36
accagctgca gccacaagcg cagcgctcga cagcctcacc agccgccatc actcgcggca   60

47

```
gtacccggcc gctgggactg caagagtggg gagtgagacg ctgctgctgt tgccgagcgc      120
gaggagacac tactactcac tcaagagtca agactcaaca gcagcagggg cgaccgagct      180
ctgcgtgcgt ggggagaacc ggagaaggca gcagaggagg gagggaggga gcgcgtggac      240
caggctaggc gcagcagc atg ggc gcc ggg atc agg gtc ctg gcg gcg ctc       291
                     Met Gly Ala Gly Ile Arg Val Leu Ala Ala Leu
                      1               5                  10

ttg gcg gcg ctc gcg gca gcc acc gcc ggc ctg acg gcg cag ctg cgg       339
Leu Ala Ala Leu Ala Ala Ala Thr Ala Gly Leu Thr Ala Gln Leu Arg
             15              20                  25

cag gac tac tac gcg gct gtg tgc ccg gac ctg gag agc atc gtg cgc       387
Gln Asp Tyr Tyr Ala Ala Val Cys Pro Asp Leu Glu Ser Ile Val Arg
         30                  35                  40

gcc gcg gtg tcc aag aag gtg cag gcg cag ccc gtc gcc gtg ggc gcc       435
Ala Ala Val Ser Lys Lys Val Gln Ala Gln Pro Val Ala Val Gly Ala
         45                  50                  55

acc atc cgc ctc ttc ttc cac gac tgc ttc gtc gag ggc tgc gac gcg       483
Thr Ile Arg Leu Phe Phe His Asp Cys Phe Val Glu Gly Cys Asp Ala
 60              65                  70                  75

tcg gtg atc ctg gtg tcc acg ggg aac aac acg gcg gag aag gac cac       531
Ser Val Ile Leu Val Ser Thr Gly Asn Asn Thr Ala Glu Lys Asp His
                 80              85                  90

ccg agc aac ctc tcc ctg gcc ggc gac ggc ttc gac acc gtc atc cag       579
Pro Ser Asn Leu Ser Leu Ala Gly Asp Gly Phe Asp Thr Val Ile Gln
             95                 100                 105

gcc aag gcg gcc gtg gac gcc gtg ccg gcg tgc gcc aac cag gtg tcg       627
Ala Lys Ala Ala Val Asp Ala Val Pro Ala Cys Ala Asn Gln Val Ser
         110                 115                 120

tgc gcc gac atc ctg gcg ctg gcc acc cgg gac gtc att gag ctg gct       675
Cys Ala Asp Ile Leu Ala Leu Ala Thr Arg Asp Val Ile Glu Leu Ala
         125                 130                 135

ggc ggg ccg tcg tac gcg gtg gag ctg ggg agg ctg gac ggg ctg gtg       723
Gly Gly Pro Ser Tyr Ala Val Glu Leu Gly Arg Leu Asp Gly Leu Val
140                 145                 150                 155

tcc atg tcc acc aac gtc gac ggc aag ctg ccg ccg ccg tcc ttc aac       771
Ser Met Ser Thr Asn Val Asp Gly Lys Leu Pro Pro Pro Ser Phe Asn
                 160                 165                 170

ctg gac cag ctg acg agc att ttc gcc ctc aac aac ctg tcg cag gcc       819
Leu Asp Gln Leu Thr Ser Ile Phe Ala Leu Asn Asn Leu Ser Gln Ala
             175                 180                 185

gac atg att gct tta tct gcg gcg cac acg gtg ggg ttc gcg cac tgc       867
Asp Met Ile Ala Leu Ser Ala Ala His Thr Val Gly Phe Ala His Cys
         190                 195                 200

agc acg ttc tcg gac cgg atc cag ccg cag tcg gtg gac ccg acg atg       915
Ser Thr Phe Ser Asp Arg Ile Gln Pro Gln Ser Val Asp Pro Thr Met
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```
aac gcg acg tac gcg gag gac ctg cag gcg gcg tgc ccg gcg ggg gtg      963
Asn Ala Thr Tyr Ala Glu Asp Leu Gln Ala Ala Cys Pro Ala Gly Val
220             225             230             235

gac ccc aac atc gcg ctg cag ctg gac ccc gtg acg ccg cag gcc ttc     1011
Asp Pro Asn Ile Ala Leu Gln Leu Asp Pro Val Thr Pro Gln Ala Phe
            240             245             250

gac aac cag tac ttc gcc aac ctg gtg gac ggc cgg ggg ctc ttc gcc     1059
Asp Asn Gln Tyr Phe Ala Asn Leu Val Asp Gly Arg Gly Leu Phe Ala
            255             260             265

tcc gac cag gtg ctc ttc tcc gac gcg cgg tcg cag ccc acc gtg gtg     1107
Ser Asp Gln Val Leu Phe Ser Asp Ala Arg Ser Gln Pro Thr Val Val
            270             275             280

gcg tgg gcg cag aac gcc acc gac ttc gag cag gcc ttc gtc gac gcc     1155
Ala Trp Ala Gln Asn Ala Thr Asp Phe Glu Gln Ala Phe Val Asp Ala
            285             290             295

atc acc agg ctc ggc cgc gtc ggc gtc aag acc gac ccg tcg ctg ggg     1203
Ile Thr Arg Leu Gly Arg Val Gly Val Lys Thr Asp Pro Ser Leu Gly
300             305             310             315

gac gtc cgc cgc gac tgc gcc ttc ctc aac tga aaaaggatga taagcgctag   1256
Asp Val Arg Arg Asp Cys Ala Phe Leu Asn *
            320             325

ctagtaggtg taagcatcgg ctggcactca cctggaggaa gaggccggct tttggtcagt   1316
ggtgacatct gatggatgtc caatcacgca ggatgccaaa aggcccacgc ctacgcatat   1376
gaacggtgaa atatagcgaa ctctaaatag caaacactgc tggagggctc ttggacgcta   1436
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<212> PRT
<213> Zea mays

<400> 37
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Ala Ala Thr Ala Gly Leu Thr Ala Gln Leu Arg Gln Asp Tyr Tyr Ala
            20              25              30
Ala Val Cys Pro Asp Leu Glu Ser Ile Val Arg Ala Ala Val Ser Lys
        35              40              45
Lys Val Gln Ala Gln Pro Val Ala Val Gly Ala Thr Ile Arg Leu Phe
    50              55              60
Phe His Asp Cys Phe Val Glu Gly Cys Asp Ala Ser Val Ile Leu Val
65              70              75              80
Ser Thr Gly Asn Asn Thr Ala Glu Lys Asp His Pro Ser Asn Leu Ser
                85              90              95
Leu Ala Gly Asp Gly Phe Asp Thr Val Ile Gln Ala Lys Ala Ala Val
            100             105             110
Asp Ala Val Pro Ala Cys Ala Asn Gln Val Ser Cys Ala Asp Ile Leu
        115             120             125
```

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```
Ala Leu Ala Thr Arg Asp Val Ile Glu Leu Ala Gly Gly Pro Ser Tyr
    130                 135             140
Ala Val Glu Leu Gly Arg Leu Asp Gly Leu Val Ser Met Ser Thr Asn
145             150                 155                 160
Val Asp Gly Lys Leu Pro Pro Pro Ser Phe Asn Leu Asp Gln Leu Thr
            165                 170                 175
Ser Ile Phe Ala Leu Asn Asn Leu Ser Gln Ala Asp Met Ile Ala Leu
            180                 185                 190
Ser Ala Ala His Thr Val Gly Phe Ala His Cys Ser Thr Phe Ser Asp
        195                 200                 205
Arg Ile Gln Pro Gln Ser Val Asp Pro Thr Met Asn Ala Thr Tyr Ala
    210                 215                 220
Glu Asp Leu Gln Ala Ala Cys Pro Ala Gly Val Asp Pro Asn Ile Ala
225                 230                 235                 240
Leu Gln Leu Asp Pro Val Thr Pro Gln Ala Phe Asp Asn Gln Tyr Phe
            245                 250                 255
Ala Asn Leu Val Asp Gly Arg Gly Leu Phe Ala Ser Asp Gln Val Leu
            260                 265                 270
Phe Ser Asp Ala Arg Ser Gln Pro Thr Val Val Ala Trp Ala Gln Asn
    275                 280                 285
Ala Thr Asp Phe Glu Gln Ala Phe Val Asp Ala Ile Thr Arg Leu Gly
    290                 295                 300
Arg Val Gly Val Lys Thr Asp Pro Ser Leu Gly Asp Val Arg Arg Asp
305             310                 315                 320
Cys Ala Phe Leu Asn
            325
```

50